SERVICE & OPERATING MANUAL

SANDPIPER®
A WARREN RUPP PUMP BRAND

Model S15 Metallic Design Level 1 Including T15 FDA Compliant Models

I M2 c/b T5
II 2GD b T5

U.S. Patent #
5,996,627
Other U.S. Patents
Applied for

CE

Table of Contents

Engineering Data and Temperature Limitations 1
Explanation of Pump Nomenclature 2
Performance Curve 3
Dimensions (S15) 4
Dimensions (T15) 5
Principle of Pump Operation 6
Installation and Start-Up 6
Air Supply 6
Air Valve Lubrication 6
Air Line Moisture 6
Air Inlet and Priming 6
Between Uses 6
Installation Guide 7
Troubleshooting 8
Warranty 8
Recycling 9
Important Safety Information 9
Material Codes 10
Composite Repair Parts Drawing 12
Available Service and Conversion Kits 12
Composite Repair Parts List (S15) 13
Composite Repair Parts List (T15) 14
**Air Valve Drawing, Parts List, Service Instructions (Cast Iron Centers Only) .. 15
**Air Valve Drawing, Parts List, Service Instructions (Aluminum Centers Only) 16
**Air Valve w/Stroke Indicator Drawing and Parts List 17
**Air Valve w/Stroke Indicator Servicing 18
**Solenoid Shifted Air Valve Drawing 19
**Solenoid Shifted Air Valve Parts List 19
**Solenoid Shifted Air Valve Option 20
Diaphragm Service Drawing, with Overlay 21
Diaphragm Service Drawing, Non-Overlay 21
Diaphragm Servicing 22
Overlay Diaphragm Servicing 22
Actuator Plunger Servicing 23
Check Valve Servicing 24
Check Valve Drawing 24
**Optional Muffler Configurations 25
**Optional Muffler Configuration Drawing 25
Pumping Hazardous Liquids 26
Converting Pump for Piping Exhaust Air 26
Converted Exhaust Illustration 26
**Leak Detection Options & Drawing 27
**RuppTech® Electronic Leak Detector Installation 27
**RuppTech® Mechanical Leak Detector Installation 27
**RuppTech® Pulse Output Kit Drawing 28
**RuppTech® Pulse Output Kit Options 28
Grounding the Pump 29

****Note: Not ATEX compliant**

WARREN RUPP®, INC. • A Unit of IDEX Corporation • P.O. Box 1568, Mansfield, Ohio 44901-1568 USA • Telephone (419) 524-8388 • Fax (419) 522-7867 • www.warrenrupp.com

520-292-000 11/04 Rev C

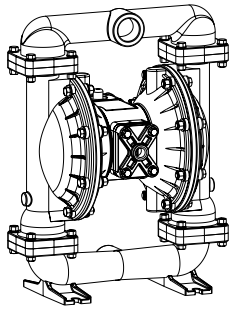
©Copyright 2004 Warren Rupp, Inc. All rights reserved.

WARREN RUPP®

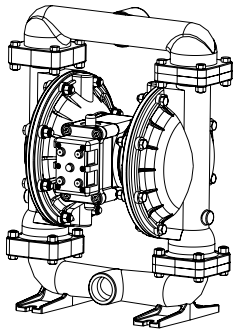
Quality System ISO9001 Certified

Environmental Management System ISO14001 Certified

IDEX CORPORATION



Air Inlet Side View



Air Exhaust Side View

I M2 c/b T5
II 2GD b T5

U.S. Patent # 5,996,627
Other U.S. Patents Applied for

CE

SANDPIPER®
A WARREN RUPP PUMP BRAND

S15 Metallic Design Level 1 Ball Valve

Air-Powered Double-Diaphragm Pump

ENGINEERING, PERFORMANCE & CONSTRUCTION DATA

INTAKE/DISCHARGE PIPE SIZE	CAPACITY	AIR VALVE	SOLIDS-HANDLING	HEADS UP TO	DISPLACEMENT/STROKE
1½" NPT(internal) 1½" BSPT Tapered (internal)	0 to 106 gallons per minute (0 to 401 liters per minute)	No-lube, no-stall design	Up to .25 in. (6mm)	125 psi or 289 ft. of water (8.6 Kg/cm² or 86 meters)	.41 Gallon / 1.55 liter

CAUTION! ***Operating temperature limitations are as follows:***

Materials	Operating Temperatures Maximum	Minimum
Buna N/White Nitrile: General purpose, oil-resistant. Shows good solvent, oil, water and hydraulic fluid resitance. Should not be used with highly polar solvents like acetone and MEK, ozone, chlorinated hydrocarbons and nitro hyrdrocarbons.	190° F 88° C	-10° F -23° C
EPDM: Shows very good water and chemical resistance. Has poor resistance to oil and solvents, but is fair in ketones and alcohols.	280° F 138° C	-40° F -40° C
Neoprene: All purpose. Resistant to vegetable oil. Generally not affected by moderate chemicals, fats, greases and many oils and solvents. Generally attacked by strong oxidizing acids, ketones, esters, nitro hydrocarbons and chlorinated aromatic hydrocarbons.	200° F 93° C	-10° F -23° C
Santoprene®: Injection molded thermoplastic elastomer with no fabric layer. Long mechanical flex life. Excellent abrasion resistance.	275° F 135° C	-40° F -40° C
Virgin PTFE: Chemically inert, virtually impervious. Very few chemicals are known to react chemically with PTFE- molten alkali metals, turbulent liquid or gaseous fluorine and a few fluoro-chemicals such as chlorine trifluoride or oxygen difluoride which readily liberate free fluorine at elevated temperatures.	220° F 104° C	-35° F -37° C
Viton®: Shows good resistance to a wide range of oils and solvents; especially all aliphatic, aromatic and halogenated hydrocarbons, acids, animal and vegrtable oils. Hot water or hot aqueous solutions (over 70°F) will attack Viton®.	350° F 177° C	-40° F -40° C
Polpropylene:	180° F 82° C	32° F 0° C
Polyethylene:	180° F 82° C	-35° F -37° C

For specific applications, always consult the Warren Rupp Chemical Resistance Chart

SANDPIPER® pumps are designed to be powered only by compressed air.

Explanation of Pump Nomenclature
S15 Metallic · Design Level 1· Ball Valve

Model	Pump Brand	Pump Size	Check Valve Type	Design Level	Wetted Material	Diaphragm/ Check Valve Materials	Check Valve Seat	Non-Wetted Material Options	Porting Options	Pump Style	Pump Options	Kit Options	Shipping Weight lbs. (kg)
S15B1ABWANS000.	S	15	B	1	A	B	W	A	N	S	0	00.	53 (24)
S15B1AEWANS000.	S	15	B	1	A	E	W	A	N	S	0	00.	53 (24)
S15B1AGTANS000.	S	15	B	1	A	G	T	A	N	S	0	00.	53 (24)
S15B1ANWANS000.	S	15	B	1	A	N	W	A	N	S	0	00.	53 (24)
S15B1A1WANS000.	S	15	B	1	A	1	W	A	N	S	0	00.	53 (24)
S15B1AVTANS000.	S	15	B	1	A	V	T	A	N	S	0	00.	53 (24)
S15B1IBWANS000.	S	15	B	1	I	B	W	A	N	S	0	00.	93 (42)
S15B1IEWANS000.	S	15	B	1	I	E	W	A	N	S	0	00.	93 (42)
S15B1IGTANS000.	S	15	B	1	I	G	T	A	N	S	0	00.	93 (42)
S15B1INWANS000.	S	15	B	1	I	N	W	A	N	S	0	00.	93 (42)
S15B1I1WANS000.	S	15	B	1	I	1	W	A	N	S	0	00.	93 (42)
S15B1IVTANS000.	S	15	B	1	I	V	T	A	N	S	0	00.	93 (42)
S15B1IEWANS000.	S	15	B	1	I	E	W	A	N	S	0	00.	95 (43)
S15B1SGTANS000.	S	15	B	1	S	G	T	A	N	S	0	00.	95 (43)
S15B1SNWANS000.	S	15	B	1	S	N	W	A	N	S	0	00.	95 (43)
S15B1S1WANS000.	S	15	B	1	S	1	W	A	N	S	0	00.	95 (43)
S15B1SVTANS000.	S	15	B	1	S	V	T	A	N	S	0	00.	95 (43)
T15B1SFSWTS000.	T	15	B	1	S	F	S	W	T	S	0	00.	95 (43)

Pump Brand
S= SANDPIPER®
T= FDA Compliant

Pump Size
15=1½"

Check Valve Type
B= Soild Ball
W= Weighted Ball

Design Level
1= Design Level

Wetted Material
A= Aluminum
I = Cast Iron
S= Stainless Steel

Diaphragm Check Valve Materials
1= Santoprene/Santoprene
*A= PTFE - FDA Nitrile Backup/PTFE
B= Buna/Buna
D= FDA Santoprene/FDA Santoprene
E= EPDM/EPDM
*F= FDA Nitrile/FDA Nitrile
G= PTFE -Neoprene/PTFE
I= EPDM/Santoprene
N= Neoprene/Neoprene
V= Viton/Viton

Check Valve Seat
A= Aluminum
C= Carbon Steel
S= Stainless Steel
T= PTFE
W= UHMW Polyethylene

Non-Wetted Material Options
A= Painted Aluminum
J= Painted Aluminum w/PTFE Coated Hardware
S= Stainless Steel w/Stainless Steel Hardware
W= White Epoxy Coated Aluminum & Stainless Steel Hardware
Y= Painted Aluminum w/ Stainless Steel Hardware

Porting Options
N= NPT Threads
B= BSPT (Tapered) Threads

Pump Style
S= Standard

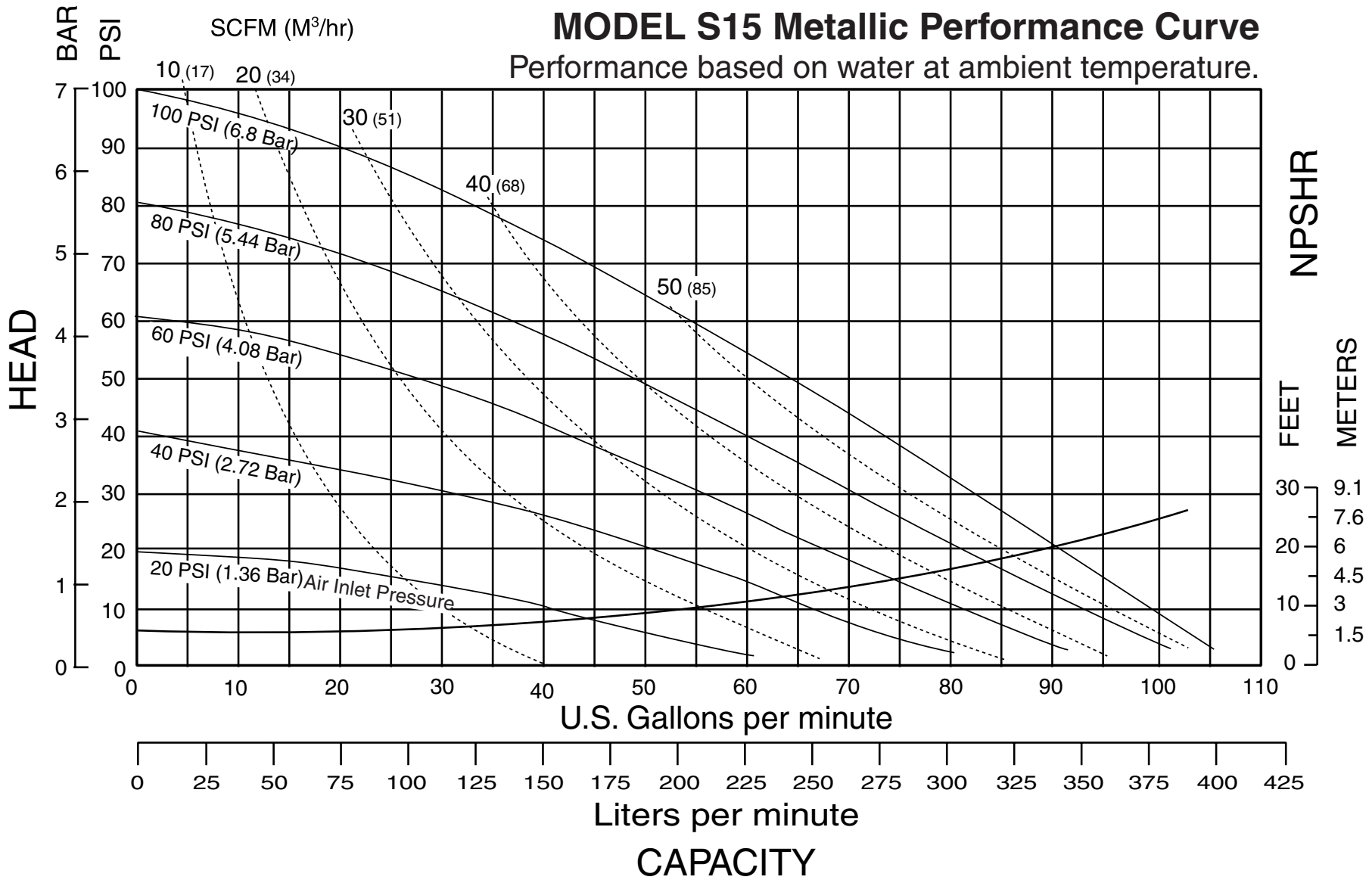
Pump Options
0= None
1= 3M Muffler
2= Mesh Muffler
3= High temperature Air Valve w/Encapsulated Muffler
4= High temperature Air Valve w/3M Muffler
5= High temperature Air Valve w/Mesh Muffler
6= Metal Muffler **⚠

Kit Options
00.= None**⚠
P0.= 0-30VDC Pulse Output Kit
P1.= Intrinsically-Safe 10-30VDC Pulse Output Kit
P2.= 110/120 or 220/240VAC Pulse Output Kit
P3.= Intrinsically-Safe 110/120VAC Pulse Output Kit
P4.= Intrinsically-Safe 220/240VAC Pulse Output Kit
SP.= Stroke Indicator Pins

*⚠ **Note: ATEX compliant pumps must be ordered with a metal muffler and no kit options⚠**

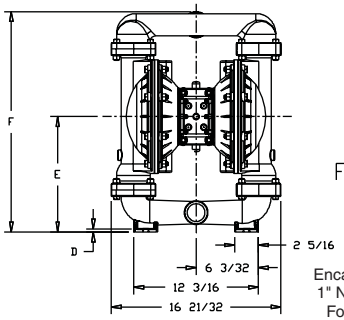
***Release Pending**

Performance Curve, S15 Metallic Design Level 1

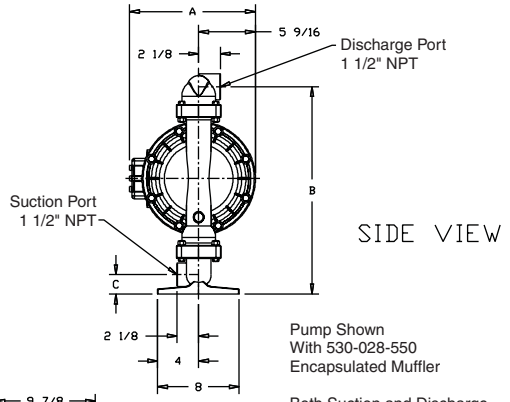


Dimensions: S15 Metallic

Dimensions in Inches
Dimensional Tolerance:±1/8"



FRONT VIEW

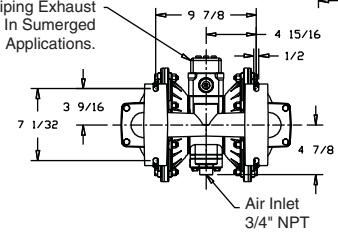


SIDE VIEW

Pump Shown
With 530-028-550
Encapsulated Muffler

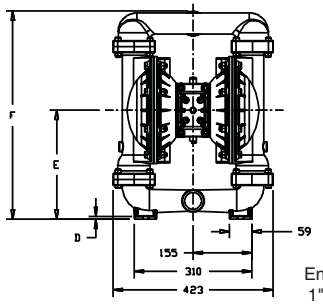
Both Suction and Discharge
Ports Are Available With
1 1/2" BSP Tapered Connection

Encapsulated Muffler
1" NPT Exhaust Port
For optional Muffler
Styles or Piping Exhaust
Air In Sumerged
Applications.

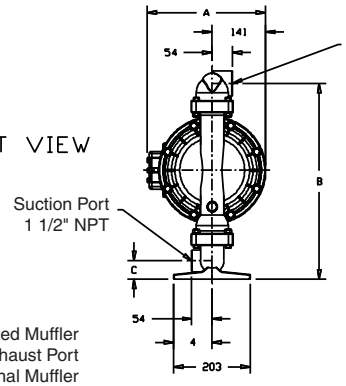


BOTTOM VIEW

Dimensions in Millimeters
Dimensional Tolerance:± 3mm



FRONT VIEW

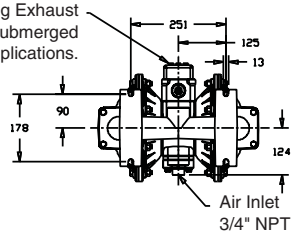


SIDE VIEW

Pump Shown
With 530-028-550
Encapsulated Muffler

Both Suction and Discharge
Ports Are Available With
1 1/2" BSP Tapered Connection

Encapsulated Muffler
1" NPT Exhaust Port
For Optional Muffler
Styles or Piping Exhaust
Air in Submerged
Applications.

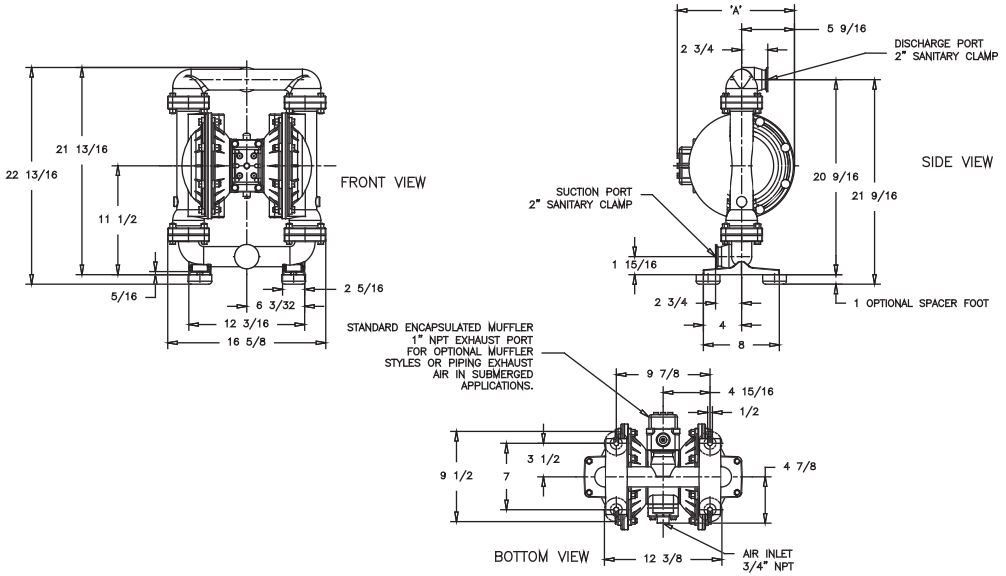


BOTTOM VIEW

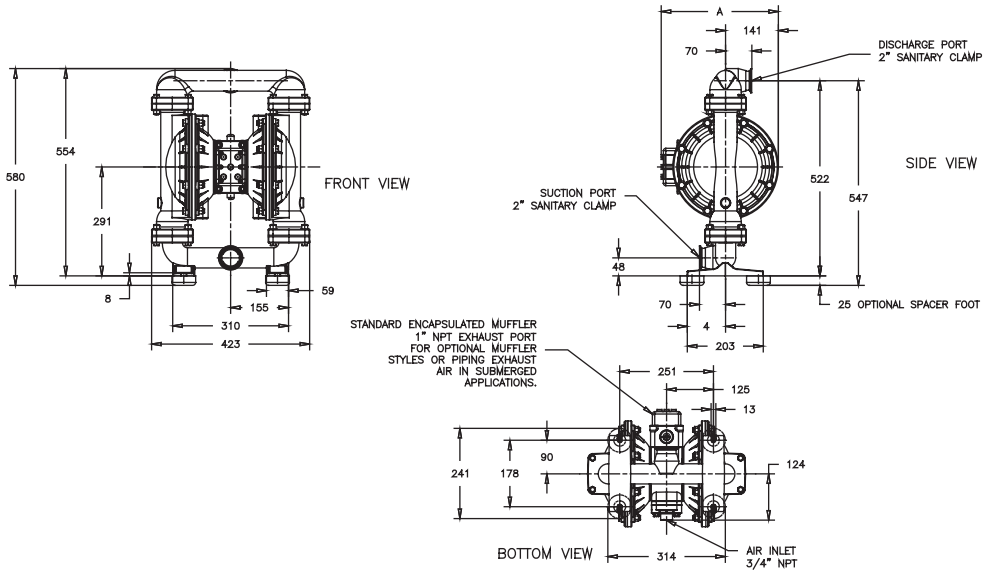
Dimension	A	B	C	D	E	F
Encapsulated Muffler	12 11/32 314					
Pulse Output Kit	13 23/32 349					
Aluminum		20 5/16 516	1 29/32 48	5/16 8	11 5/16 287	21 19/32 548
Stainless Steel		20 3/8 518	1 31/32 50	3/8 10	11 3/8 289	21 21/32 550
Mesh Muffler	14 15/16 379					
Sound Dampening Muffler	14 15/16 379					
Metal Muffler	14 1/2 368					

Dimensions: T15 Metallic

Dimensions in Inches
Dimensional Tolerance:±1/8"



Dimensions in Millimeters
Dimensional Tolerance:± 3mm



Dimension	A	B	C	D	E	F
Encapsulated Muffler	12 11/32 314					
Pulse Output Kit	13 23/32 349					
Aluminum		20 5/16 516	1 29/32 48	5/16 8	11 5/16 287	21 19/32 548
Stainless Steel		20 3/8 518	1 31/32 50	3/8 10	11 3/8 289	21 21/32 550
Mesh Muffler	14 15/16 379					
Sound Dampening Muffler	14 15/16 379					
Metal Muffler	14 1/2 368					

PRINCIPLE OF PUMP OPERATION

This ball type check valve pump is powered by compressed air and is a 1:1 ratio design. The inner side of one diaphragm chamber is alternately pressurized while simultaneously exhausting the other inner chamber. This causes the diaphragms, which are connected by a common rod secured by plates to the centers of the diaphragms, to move in a reciprocating action. (As one diaphragm performs the discharge stroke the other diaphragm is pulled to perform the suction stroke in the opposite chamber.) Air pressure is applied over the entire inner surface of the diaphragm while liquid is discharged from the opposite side of the diaphragm. The diaphragm operates in a balanced condition during the discharge stroke which allows the pump to be operated at discharge heads over 200 feet (61 meters) of water.

For maximum diaphragm life, keep the pump as close to the liquid being pumped as possible. Positive suction head in excess of 10 feet of liquid (3.048 meters) may require a back pressure regulating device to maximize diaphragm life.

Alternate pressurizing and exhausting of the diaphragm chamber is performed by an externally mounted, pilot operated, four way spool type air distribution valve. When the spool shifts to one end of the valve body, inlet pressure is applied to one diaphragm chamber and the other diaphragm chamber exhausts. When the spool shifts to the opposite end of the valve body, the pressure to the chambers is reversed. The air distribution valve spool is moved by a internal pilot valve which alternately pressurizes one end of the air distribution valve spool while exhausting the other end. The pilot valve is shifted at each end of the diaphragm stroke when a actuator plunger is contacted by the diaphragm plate. This actuator plunger then pushes the end of the pilot valve spool into position to activate the air distribution valve.

The chambers are connected with manifolds with a suction and discharge check valve for each chamber, maintaining flow in one direction through the pump.

INSTALLATION AND START-UP

Locate the pump as close to the product being pumped as possible. Keep the suction line length and number of fittings to a minimum. Do not reduce the suction line diameter.

For installations of rigid piping, short sections of flexible hose should be installed between the pump and the piping. The flexible hose reduces vibration and strain to the pumping system. A Warren Rupp Tranquilizer® surge suppressor is recommended to further reduce pulsation in flow.

AIR SUPPLY

Air supply pressure cannot exceed 125 psi (8.6 bar). Connect the pump air inlet to an air supply of sufficient capacity and pressure required for desired performance. When the air supply line is solid piping, use a short length of flexible hose not less than ½" (13mm) in diameter between the pump and the piping to reduce strain to the piping. The weight of the air supply line, regulators and filters must be supported by some means other than the air inlet cap. Failure to provide support for the piping may result in damage to the pump. A pressure regulating valve should be installed to insure air supply pressure does not exceed recommended limits.

AIR VALVE LUBRICATION

The air distribution valve and the pilot valve are designed to operate WITHOUT lubrication. This is the preferred mode of operation. There may be instances of personal preference or poor quality air supplies when lubrication of the compressed air supply is required. The pump air system will operate with properly lubricated compressed air supply. Proper lubrication requires the use of an air line lubricator (available from Warren Rupp) set to deliver one drop of SAE 10 non-detergent oil for every 20 SCFM (9.4 liters/sec.) of air the pump consumes at the point of operation. Consult the pump's published Performance Curve to determine this.

AIR LINE MOISTURE

Water in the compressed air supply can create problems such as icing or freezing of the exhaust air, causing the pump to cycle erratically or stop operating. Water in the air supply can be reduced by using a point-of-use air dryer to supplement the user's air drying equipment. This device removes water from the compressed air supply and alleviates the icing or freezing problems.

AIR INLET AND PRIMING

To start the pump, open the air valve approximately 1/2" to 3/4" turn. After the pump primes, the air valve can be opened to increase air flow as desired. If opening the valve increases cycling rate, but does not increase the rate of flow, cavitation has occurred. The valve should be closed slightly to obtain the most efficient air flow to pump flow ratio.

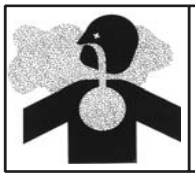
BETWEEN USES

When the pump is used for materials that tend to settle out or solidify when not in motion, the pump should be flushed after each use to prevent damage. (Product remaining in the pump between uses could dry out or settle out. This could cause problems with the diaphragms and check valves at restart.) In freezing temperatures the pump must be completely drained between uses in all cases.

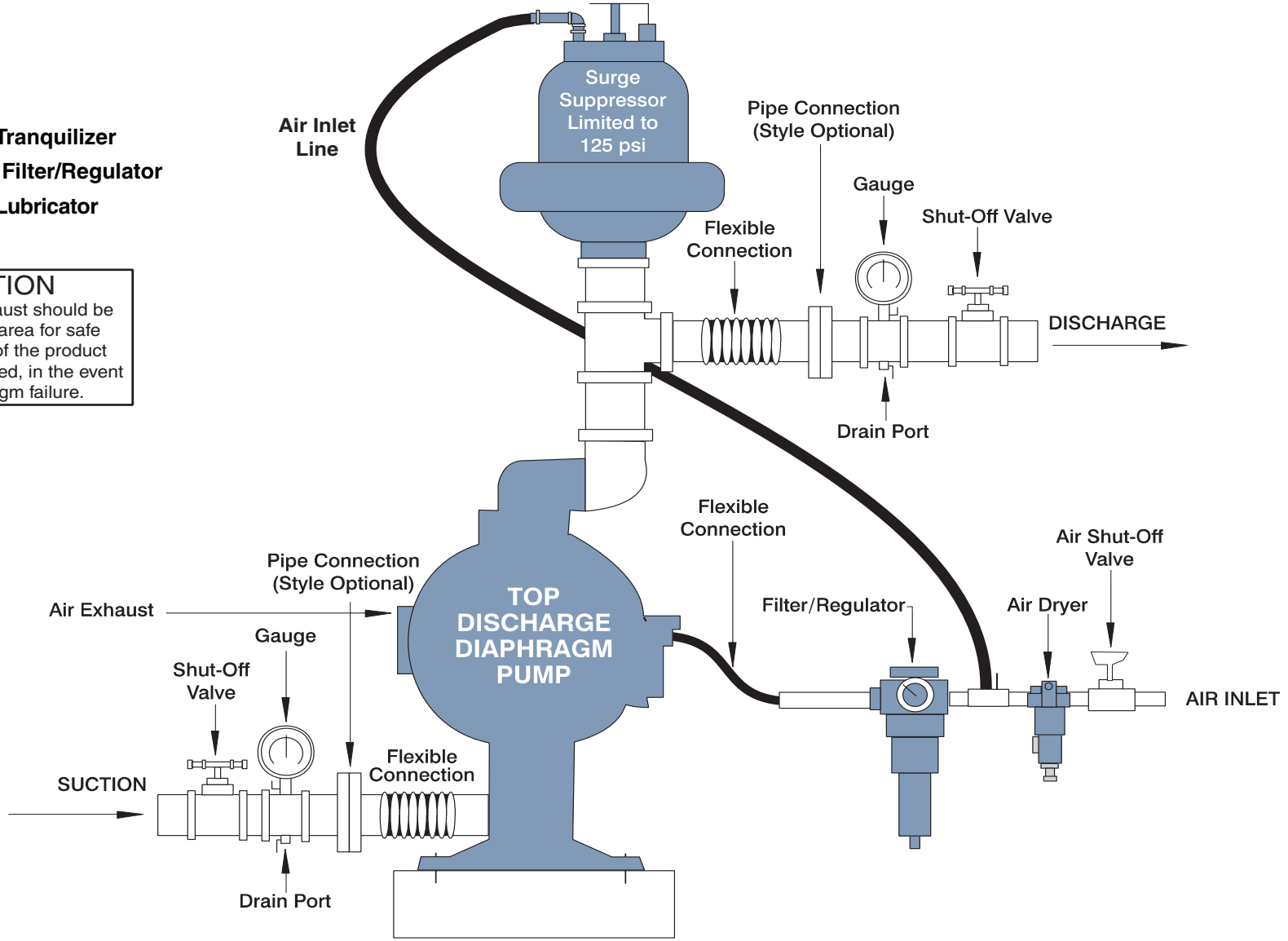
TYPICAL INSTALLATION GUIDE
For Metallic Pumps

Available from Warren Rupp

1. **TA1 or TA25 Tranquilizer**
2. **020-050-000 Filter/Regulator**
3. **020-050-001 Lubricator**
4. **Air Dryer**



⚠ CAUTION
The air exhaust should be piped to an area for safe disposition of the product being pumped, in the event of a diaphragm failure.



TROUBLESHOOTING

Possible Symptoms:

- Pump will not cycle.
- Pump cycles, but produces no flow.
- Pump cycles, but flow rate is unsatisfactory.
- Pump cycle seems unbalanced.
- Pump cycle seems to produce excessive vibration.

What to Check: Excessive suction lift in system.
Corrective Action: For lifts exceeding 20 feet (6 meters), filling the pumping chambers with liquid will prime the pump in most cases.

What to Check: Excessive flooded suction in system.
Corrective Action: For flooded conditions exceeding 10 feet (3 meters) of liquid, install a back pressure device.

What to Check: System head exceeds air supply pressure.
Corrective Action: Increase the inlet air pressure to the pump. Most diaphragm pumps are designed for 1:1 pressure ratio at zero flow.

What to Check: Air supply pressure or volume exceeds system head.
Corrective Action: Decrease inlet air pressure and volume to the pump as calculated on the published PERFORMANCE CURVE. Pump is cavitating the fluid by fast cycling.

What to Check: Undersized suction line.
Corrective Action: Meet or exceed pump connection recommendations shown on the DIMENSIONAL DRAWING.

What to Check: Restricted or undersized air line.
Corrective Action: Install a larger air line and connection. Refer to air inlet recommendations shown in your pump's SERVICE MANUAL.

What to Check: Check ESADS, the Externally Serviceable Air Distribution System of the pump.
Corrective Action: Disassemble and inspect the main air distribution valve, pilot valve and pilot valve actuators. Refer to the parts drawing and air valve section of the SERVICE MANUAL. Check for clogged discharge or closed valve before reassembly.

What to Check: Rigid pipe connections to pump.
Corrective Action: Install flexible connectors and a Warren Rupp Tranquilizer® Surge Suppressor.

What to Check: Blocked air exhaust muffler.
Corrective Action: Remove muffler screen, clean or de-ice and reinstall. Refer to the Air Exhaust section of your pump SERVICE MANUAL.

What to Check: Pumped fluid in air exhaust muffler.
Corrective Action: Disassemble pump chambers. Inspect for diaphragm rupture or loose diaphragm plate assembly. Refer to the Diaphragm Replacement section of your pump SERVICE MANUAL.

What to Check: Suction side air leakage or air in product.
Corrective Action: Visually inspect all suction side gaskets and pipe connections.

What to Check: Obstructed check valve.
Corrective Action: Disassemble the wet end of the pump and manually dislodge obstruction in the check valve pocket. Refer to the Check Valve section of the pump SERVICE MANUAL for disassembly instructions.

What to Check: Worn or misaligned check valve or check valve seat.
Corrective Action: Inspect check valves and seats for wear and proper seating. Replace if necessary. Refer to Check Valve section of the pump SERVICE MANUAL for disassembly instructions.

What to Check: Blocked suction line.
Corrective Action: Remove or flush obstruction. Check and clear all suction screens and strainers.

What to Check: Blocked discharge line.
Corrective Action: Check for obstruction or closed discharge line valves.

What to Check: Blocked pumping chamber.
Corrective Action: Disassemble and inspect the wetted chambers of the pump. Remove or flush any obstructions. Refer to the pump SERVICE MANUAL for disassembly instructions.

What to Check: Entrained air or vapor lock in one or both pumping chambers.
Corrective Action: Purge chambers through tapped chamber vent plugs. PURGING THE CHAMBERS OF AIR CAN BE DANGEROUS! Contact the Warren Rupp Technical Services Group before performing this procedure. Any model with top-ported discharge will reduce or eliminate problems with entrained air.

If your pump continues to perform below your expectations, contact your local Warren Rupp Distributor or factory Technical Services Group for a service evaluation.

WARRANTY

Refer to the enclosed Warren Rupp Warranty Certificate.

Recycling

Many components of SANDPIPER® Metallic AODD pumps are made of recyclable materials (see chart on page 10 for material specifications). We encourage pump users to recycle worn out parts and pumps whenever possible, after any hazardous pumped fluids are thoroughly flushed.

I M2 c/b T5
II 2GD b T5

CE

Pump complies with EN809 Pumping Directive and Directive 98/37/EC Safety of Machinery, and ATEX 100a Directive 94/9/EC Equipment for use in Potentially Explosive Environments. For reference to the directive certificates visit: www.warrenrupp.com.

Important Safety Information

⚠ IMPORTANT

Read these safety warnings and instructions in this manual completely, before installation and start-up of the pump. It is the responsibility of the purchaser to retain this manual for reference. Failure to comply with the recommendations stated in this manual will damage the pump, and void factory warranty.

⚠ CAUTION

Before pump operation, inspect all gasketed fasteners for looseness caused by gasket creep. Re-torque loose fasteners to prevent leakage. Follow recommended torques stated in this manual.

⚠ WARNING

Before maintenance or repair, shut off the compressed air line, bleed the pressure, and disconnect the air line from the pump. The discharge line may be pressurized and must be bled of its pressure.

⚠ WARNING

In the event of diaphragm rupture, pumped material may enter the air end of the pump, and be discharged into the atmosphere. If pumping a product which is hazardous or toxic, the air exhaust must be piped to an appropriate area for safe disposition.

⚠ WARNING

Take action to prevent static sparking. Fire or explosion can result, especially when handling flammable liquids. The pump, piping, valves, containers or other miscellaneous equipment must be grounded. (See page 28)

⚠ WARNING

This pump is pressurized internally with air pressure during operation. Always make certain that all bolting is in good condition and that all of the correct bolting is reinstalled during assembly.

⚠ WARNING

When used for toxic or aggressive fluids, the pump should always be flushed clean prior to disassembly.

⚠ WARNING

Before doing any maintenance on the pump, be certain all pressure is completely vented from the pump, suction, discharge, piping, and all other openings and connections. Be certain the air supply is locked out or made non-operational, so that it cannot be started while work is being done on the pump. Be certain that approved eye protection and protective clothing are worn all times in the vicinity of the pump. Failure to follow these recommendations may result in serious injury or death.

⚠ WARNING

Airborne particles and loud noise hazards.

Wear ear and eye protection.

Material Codes

The Last 3 Digits of Part Number

000 ..... Assembly, sub-assembly; and some purchased items
010 ..... Cast Iron
012 ..... Powered Metal
015 ..... Ductile Iron
020 ..... Ferritic Malleable Iron
025 ..... Music Wire
080 ..... Carbon Steel, AISI B-1112
100 ..... Alloy 20
110 ..... Alloy Type 316 Stainless Steel
111 ..... Alloy Type 316 Stainless Steel (Electro Polished)
112 ..... Alloy "C" (Hastelloy equivalent)
113 ..... Alloy Type 316 Stainless Steel (Hand Polished)
114 ..... 303 Stainless Steel
115 ..... 302/304 Stainless Steel
117 ..... 440-C Stainless Steel (Martensitic)
120 ..... 416 Stainless Steel (Wrought Martensitic)
123 ..... 410 Stainless Steel (Wrought Martensitic)
148 ..... Hardcoat Anodized Aluminum
149 ..... 2024-T4 Aluminum
150 ..... 6061-T6 Aluminum
151 ..... 6063-T6 Aluminum
152 ..... 2024-T4 Aluminum (2023-T351)
154 ..... Almag 35 Aluminum
155 ..... 356-T6 Aluminum
156 ..... 356-T6 Aluminum
157 ..... Die Cast Aluminum Alloy #380
158 ..... Aluminum Alloy SR-319
159 ..... Anodized Aluminum
162 ..... Brass, Yellow, Screw Machine Stock
165 ..... Cast Bronze, 85-5-5-5
166 ..... Bronze, SAE 660
170 ..... Bronze, Bearing Type, Oil Impregnated
175 ..... Die Cast Zinc
180 ..... Copper Alloy
305 ..... Carbon Steel, Black Epoxy Coated
306 ..... Carbon Steel, Black PTFE Coated
307 ..... Aluminum, Black Epoxy Coated
308 ..... Stainless Steel, Black PTFE Coated
309 ..... Aluminum, Black PTFE Coated
310 ..... Kynar Coated
313 ..... Aluminum, White Epoxy Coated
330 ..... Zinc Plated Steel
331 ..... Chrome Plated Steel
332 ..... Aluminum, Electroless Nickel Plated
333 ..... Carbon Steel, Electroless Nickel Plated
335 ..... Galvanized Steel
336 ..... Zinc Plated Yellow Brass
337 ..... Silver Plated Steel
340 ..... Nickel Plated
342 ..... Filled Nylon
351 ..... Food Grade Santoprene
353 ..... Geolast; Color: Black
354 ..... Injection Molded #203-40 Santoprene-Duro 40D +/-5; Color: RED
355 ..... Thermal Plastic
356 ..... Hytrel
357 ..... Injection Molded Polyurethane
358 ..... Urethane Rubber (Some Applications) (Compression Mold)
359 ..... Urethane Rubber
360 ..... Buna-N Rubber. Color coded: RED
361 ..... Buna-N
363 ..... Viton (Flurorel). Color coded: YELLOW
364 ..... E.P.D.M. Rubber. Color coded: BLUE
365 ..... Neoprene Rubber. Color coded: GREEN
366 ..... Food Grade Nitrile
368 ..... Food Grade EPDM
370 ..... Butyl Rubber. Color coded: BROWN
371 ..... Philthane (Tuftane)
374 ..... Carboxylated Nitrile
375 ..... Fluorinated Nitrile
378 ..... High Density Polypropylene
379 ..... Conductive Nitrile
405 ..... Cellulose Fibre
408 ..... Cork and Neoprene
425 ..... Compressed Fibre
426 ..... Blue Gard
440 ..... Vegetable Fibre
465 ..... Fibre
500 ..... Delrin 500
501 ..... Delrin 570
502 ..... Conductive Acetal, ESD-800
503 ..... Conductive Acetal, Glass-Filled
505 ..... Acrylic Resin Plastic
506 ..... Delrin 150
520 ..... Injection Molded PVDF Natural color
540 ..... Nylon
541 ..... Nylon
542 ..... Nylon
544 ..... Nylon Injection Molded
550 ..... Polyethylene
551 ..... Glass Filled Polypropylene
552 ..... Unfilled Polypropylene
553 ..... Unfilled Polypropylene
555 ..... Polyvinyl Chloride
556 ..... Black Vinyl
558 ..... Conductive HDPE
570 ..... Rulon II
580 ..... Ryton
590 ..... Valox
591 ..... Nylatron G-S
592 ..... Nylatron NSB
600 ..... PTFE (virgin material) Tetrafluorocarbon (TFE)
601 ..... PTFE (Bronze and moly filled)
602 ..... Filled PTFE
603 ..... Blue Gylon
604 ..... PTFE
606 ..... PTFE
607 ..... Envelon
608 ..... Conductive PTFE
610 ..... PTFE Encapsulated Silicon
611 ..... PTFE Encapsulated Viton
632 ..... Neoprene/Hytrel
633 ..... Viton/PTFE
634 ..... EPDM/PTFE
635 ..... Neoprene/PTFE
637 ..... PTFE , Viton/PTFE
638 ..... PTFE , Hytrel/PTFE
639 ..... Buna-N/TFE
643 ..... Santoprene®/EPDM
644 ..... Santoprene®/PTFE
656 ..... Santoprene Diaphragm and Check Balls/EPDM Seats
661 ..... EPDM/Santoprene
666 ..... FDA Nitrile Diaphragms PTFE Overlay, Balls, and Seals

Delrin, Viton and Hytrel are registered tradenames of E.I. DuPont.

Gylon is a registered tradename of Garlock, Inc.

Nylatron is a registered tradename of Polymer Corp.

Santoprene is a registered tradename of Monsanto Corp.

Rulon II is a registered tradename of Dixion Industries Corp.

Hastelloy-C is a registered tradename of Cabot Corp.

Ryton is a registered tradename of Phillips Chemical Co.

Valox is a registered tradename of General Electric Co.

Warren Rupp, SANDPIPER, PortaPump, Tranquilizer and SludgeMaster are registered tradenames of Warren Rupp, Inc.

Composite Repair Parts Drawing

****Note: Pumps equipped with these components are not ATEX compliant.**

AVAILABLE SERVICE AND CONVERSION KITS

476-227-000 **AIR END KIT** (Use With Aluminum Center)
Air Valve Assembly, Pilot Valve Assembly, Seals, Bumpers, Gaskets, Plunger and O-rings.

****476-170-000** **AIR END KIT** (Air Valve with Stroke Indicator Pin, Aluminum Center)
Seals, O-ring, Gaskets, Retaining Rings, Air Valve Sleeve and Spool Set, and Pilot Valve Assembly

476-182-360 **WET END KIT (S15)**
Buna Diaphragms, Balls, and Polyethylene Seats.

476-182-354 **WET END KIT (S15)**
Santoprene Diaphragms, Balls and Polyethylene Seats.

476-182-365 **WET END KIT (S15)**
Neoprene Diaphragms, Balls, and Polyethylene Seats.

476-182-633 **WET END KIT (S15)**
Viton Diaphragms, PTFE Balls and Seats.

476-182-635 **WET END KIT (S15)**
Neoprene Diaphragms, PTFE Overlay, Balls and Seats.

476-182-351 **WET END KIT (T15)**
FDA Santoprene Diaphragms, Balls, and PTFE Encapsulated Seals

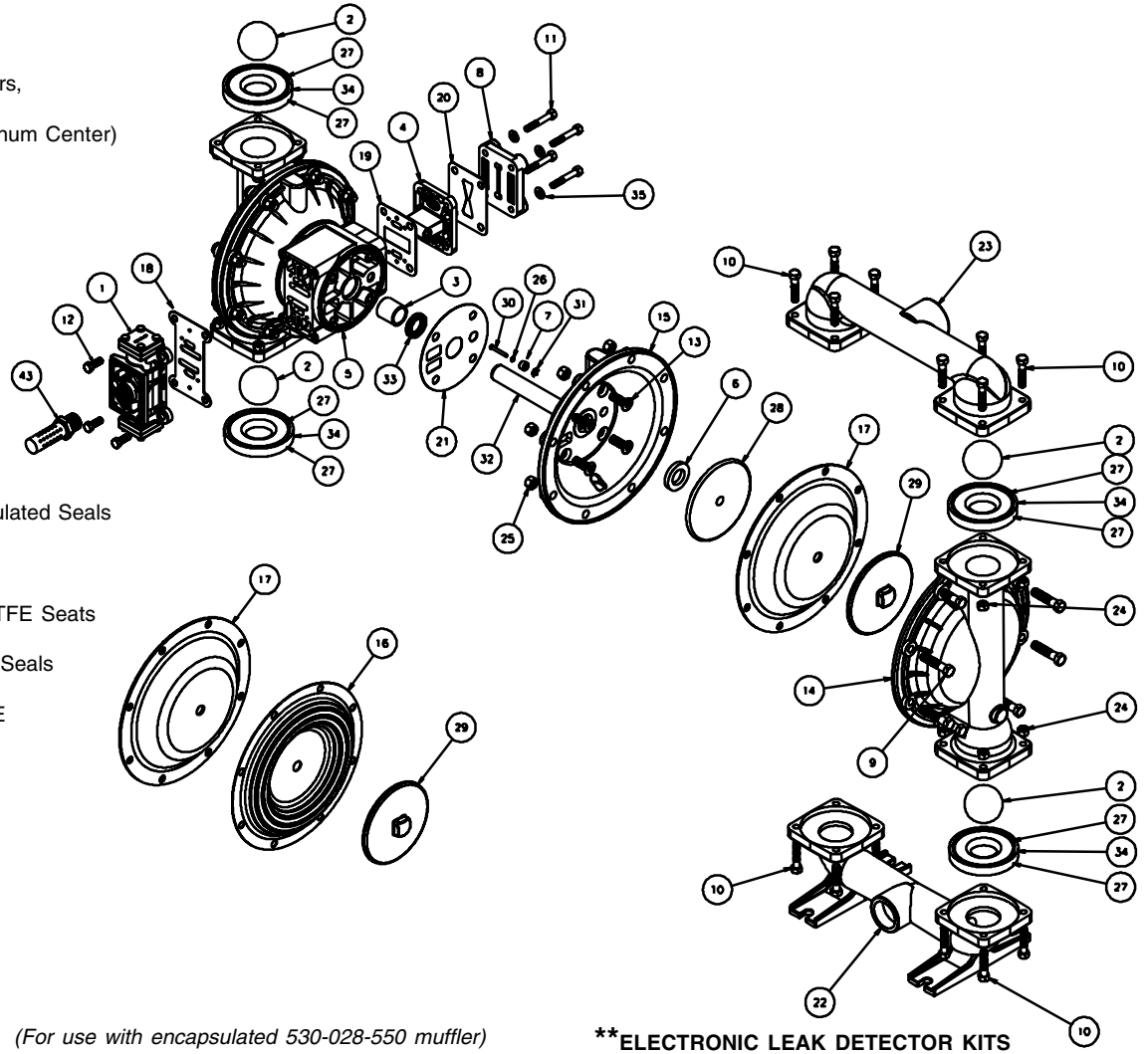
476-182-364 **WET END KIT (S15)**
EPDM Diaphragms, Balls and UHMW Seats.

476-182-654 **WET END KIT (S15)**
Santoprene Diaphragms, PTFE Overlay, PTFE Balls, PTFE Seats

476-182-366 **WET END KIT (T15)**
FDA Nitrile Diaphragms, Balls, and PTFE Encapsulated Seals

476-194-666 **WET END KIT (T15)**
FDA Nitrile Diaphragms, PTFE Overlay, Balls, and PTFE Encapsulated Seals

475-215-000 **MIDSECTION CONVERSION KIT**
(Replaces Aluminum Midsection With Cast Iron Components.) Air Inlet Cap, Intermediate Bracket, Inner Chambers and Inner Diaphragm Plates.



HARDWARE KITS

475-205-330 Zinc Plated Capscrews, Washers, and Hex Nuts

475-205-115 Stainless Steel Capscrews, Washers, and Hex Nuts

**PULSE OUTPUT KITS

(For use with 530-010-000 and 530-032-000 mufflers, or piped exhaust)

475-198-001 DC Kit
475-198-002 DC Intrinsically Safe Kit
475-198-003 110/120VAC or 220/240VAC Kit
475-198-004 110/120VAC Intrinsically Safe Kit
475-198-005 220/240VAC Intrinsically Safe Kit

(For use with encapsulated 530-028-550 muffler)

475-198-006 DC Kit
475-198-007 DC Intrinsically Safe Kit
475-198-008 110/120VAC or 220/240VAC Kit
475-198-009 110/120VAC Intrinsically Safe Kit
475-198-010 220/240VAC Intrinsically Safe Kit

**ELECTRONIC LEAK DETECTOR KITS

032-040-000 100VAC
032-037-000 220VAC

Composite Repair Parts List For S15

ITEM	PART NUMBER	DESCRIPTION	QTY
1	**031-146-000	Air Valve Assembly (Cast Iron Only)	1
	**031-141-000	Air Valve Assembly (Cast Iron Only)	1
	**031-146-000	Air Valve Assembly (Stroke Indicator Only)	1
	**031-147-000	Air Valve Assembly (Stroke Indicator Only)	1
	**031-173-001	Air Valve Assembly (w/Stainless Steel Hardware)	1
	031-183-000	Air Valve Assembly (w/Stainless Steel Hardware)	1
	031-179-000	Air Valve Assembly	1
		(ATEX compliant w/Cast Iron centers only)	
2	050-005-354	Ball, Check	4
	050-005-360	Ball, Check	4
	050-005-360W	Ball, Weighted Check	4
	050-005-363	Ball, Check	4
	050-005-364	Ball, Check	4
	050-005-365	Ball, Check	4
	050-005-365W	Ball, Weighted Check	4
	050-010-600	Ball, Check	4
3	070-006-170	Bushing	2
4	095-110-000	Pilot Valve Assembly	1
	095-110-110	Pilot Valve Assembly (use w/Cast Iron centers only)	1
5	114-024-157	Intermediate Bracket	1
	114-024-010	Intermediate Bracket	1
6	132-035-360	Bumper, Diaphragm	2
7	135-034-506	Bushing, Plunger	2
8	165-118-157	Cap, Air Inlet Assembly	1
	165-118-010	Cap, Air Inlet Assembly	1
9	170-060-115	Capscrew, Hex Hd 7/16-14 X 2.00	16
	170-060-330	Capscrew, Hex Hd 7/16-14 X 2.00	16
10	170-061-115	Capscrew, Hex Hd 3/8-16 X 1.75	16
	170-061-330	Capscrew, Hex Hd 3/8-16 X 1.75	16
11	170-069-115	Capscrew, Hex Hd 5/16-18 X 1.75	4
	170-069-330	Capscrew, Hex Hd 5/16-18 X 1.75	4
12	170-006-115	Capscrew, Hex HD 3/8-16 X 1.00	4
	170-006-330	Capscrew, Hex HD 3/8-16 X 1.00	4
	171-053-115	Capscrew, Soc Hd 3/8-16 X 2.50 (Stroke Indicator Only)	4
	171-053-330	Capscrew, Soc Hd 3/8-16 X 2.50 (Stroke Indicator Only)	4
	171-011-115	Capscrew, Soc Hd 1/2-13 x 1.00 (Stainless Center)	8
13	171-059-115	Capscrew, Soc Hd 7/16-14 X 1.25	8
	171-059-330	Capscrew, Soc Hd 7/16-14 X 1.25	8
14	196-169-156	Chamber, Outer	2
	196-169-010	Chamber, Outer	2
	196-169-110	Chamber, Outer	2
15	196-170-157	Chamber, Inner	2
	196-170-010	Chamber, Inner	2
16	286-099-354	Diaphragm	2
	286-099-360	Diaphragm	2
	286-099-363	Diaphragm	2
	286-099-364	Diaphragm	2
	286-099-365	Diaphragm	2
17	286-099-600	Diaphragm, Overlay	2
18	360-093-360	Gasket, Air Valve	1
19	360-103-360	Gasket, Pilot Valve	1
20	360-104-379	Gasket, Air Inlet	1
21	360-105-360	Gasket, Inner Chamber	2
22	518-151-156	Manifold, Suction	1
	518-151-156E	Manifold, Suction 1-1/2" BSPT	1
	518-151-010	Manifold, Suction	1
	518-151-010E	Manifold, Suction 1-1/ 2" BSPT	1
	518-151-110	Manifold, Suction	1
	518-151-110E	Manifold, Suction 1-1/ 2" BSPT	1
23	518-152-156	Manifold, Discharge	1
	518-152-156E	Manifold, Discharge 1-1/ 2" BSPT	1
	518-152-010	Manifold, Discharge	1
	518-152-010E	Manifold, Discharge 1-1/ 2" BSPT	1
	518-152-110	Manifold, Discharge	1
	518-152-110E	Manifold, Discharge 1-1/ 2" BSPT	1
24	545-005-115	Nut, Hex 3/8-16	16
	545-005-330	Nut, Hex 3/8-16	16
25	545-007-115	Nut, Hex 7/16-14	16
	545-007-330	Nut, Hex 7/16-14	16
26	560-001-379	O-Ring	2
27	560-084-360	Seal (O-Ring) (See item 34)	8
	560-084-363	Seal (O-Ring) (See item 34)	8
	560-084-364	Seal (O-Ring) (See item 34)	8
	560-084-365	O-Ring	8
	720-061-608	Seal (O-Ring) (See item 34)	8
28	612-039-157	Plate, Outer Diaphragm Assembly	2
	612-039-010	Plate, Outer Diaphragm Assembly	2
	612-097-110	Plate, Outer Diaphragm Assembly	2
29	612-195-157	Plate, Inner Diaphragm	2
	612-195-010	Plate, Inner Diaphragm	2
30	620-020-115	Plunger, Actuator	2
31	675-042-115	Ring, Retaining	2
32	685-059-120	Rod, Diaphragm	1
33	720-004-360	Seal, Diaphragm Rod	2
34	722-091-550	Seat, Check Ball	4
	722-091-080	Seat, Check Ball (seals required see item 27)	4
	722-091-110	Seat, Check Ball (seals required see item 27)	4
	722-091-150	Seat, Check Ball (seals required see item 27)	4
	722-091-600	Seat, Check Ball	4
35	901-038-115	Washer, Flat 5/16	4
	901-038-330	Washer, Flat 5/16	4
36	901-048-115	Washer, Flat 3/8 (Stroke Indicator Only)	4
	901-048-330	Washer, Flat 3/8 (Stroke Indicator Only)	4
37	570-009-363	Pad, Wear (use with #286-099-363)	2
43	530-033-000	Metal Muffler (for other muffler options see pg. 24)	1

Composite Repair Parts List For T15

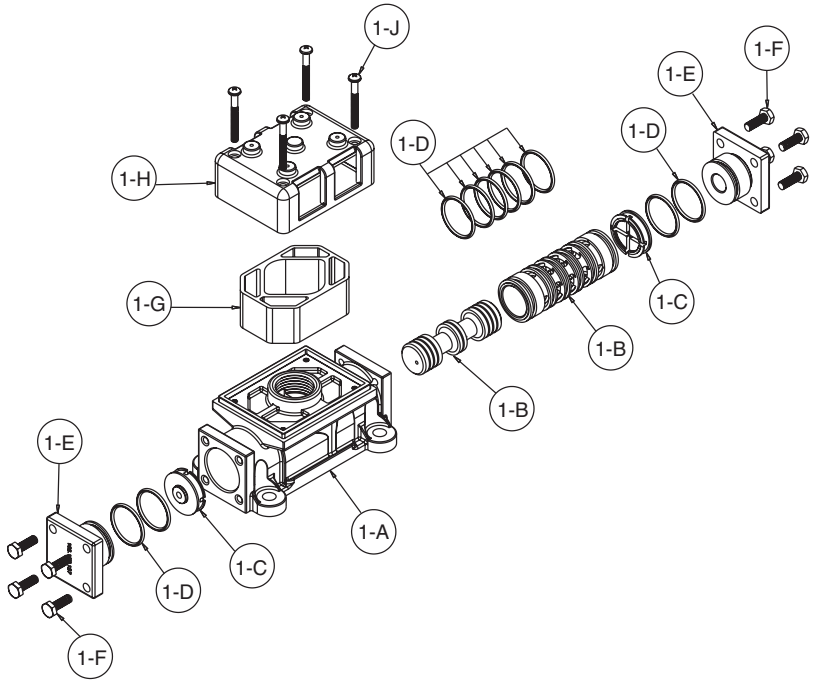
ITEM	PART NUMBER	DESCRIPTION	QTY
1	**031-146-000	Air Valve Assembly (Stroke Indicator Only)	1
	**031-147-000	Air Valve Assembly (Stroke Indicator Only)	1
	**031-173-313	Air Valve Assembly	1
	031-183-313	Air Valve Assembly	1
	031-179-000	Air Valve Assembly	1
		(ATEX compliant w/Cast Iron centers only)	
2	050-005-351	Ball, Check	4
	050-005-366	Ball, Check	4
	050-010-600	Ball, Check	4
3	070-006-170	Bushing	2
4	095-110-313	Pilot Valve Assembly	1
	095-110-110	Pilot Valve Assembly (use w/Cast Iron centers only)	1
5	114-024-313	Intermediate Bracket	1
	114-024-110	Intermediate Bracket	1
6	132-035-360	Bumper, Diaphragm	2
7	135-034-506	Bushing, Plunger	2
8	165-118-313	Cap, Air Inlet Assembly	1
	165-118-110	Cap, Air Inlet Assembly	1
9	170-060-115	Capscrew, Hex Hd 7/16-14 X 2.00	16
10	170-061-115	Capscrew, Hex Hd 3/8-16 X 1.75	16
11	170-069-115	Capscrew, Hex Hd 5/16-18 X 1.75	4
12	170-006-115	Capscrew, Hex HD 3/8-16 X 1.00	4
	171-053-115	Capscrew, Soc Hd 3/8-16 X 2.50 (Stroke Indicator Only)	4
13	171-059-115	Capscrew, Soc Hd 7/16-14 X 1.25	8
	171-011-115	Capscrew, Soc Hd 1/2-13 X 1.00 (Stainless Center)	8
14	196-169-110	Chamber, Outer	2
15	196-170-313	Chamber, Inner	2
	196-170-110	Chamber, Inner	2
16	286-099-351	Diaphragm	2
	286-099-366	Diaphragm	2
17	286-099-600	Diaphragm, Overlay	2
18	360-093-360	Gasket, Air Valve	1
19	360-103-360	Gasket, Pilot Valve	1
20	360-104-379	Gasket, Air Inlet	1
21	360-105-360	Gasket, Inner Chamber	2
22	518-151-110TC	Manifold, Suction	1
23	518-152-110TC	Manifold, Discharge	1
24	545-005-115	Nut, Hex 3/8-16	16
25	545-007-115	Nut, Hex 7/16-14	16
26	560-001-379	O-Ring	2
27	560-084-611	Seal (O-Ring) (See item 34)	8
	720-061-608	Seal (O-Ring) (See item 34)	8
28	612-097-110	Plate, Outer Diaphragm Assembly	2
29	612-195-157	Plate, Inner Diaphragm	2
30	620-020-115	Plunger, Actuator	2
31	675-042-115	Ring, Retaining	2
32	685-059-120	Rod, Diaphragm	1
33	720-004-360	Seal, Diaphragm Rod	2
34	722-091-110	Seat, Check Ball (seals required see item 27)	4
35	901-038-115	Washer, Flat 5/16	4
36	901-048-115	Washer, Flat 3/8 (Stroke Indicator Only)	4
43	530-033-000	Metal Muffler (for other muffler options see pg. 24)	1

Parts Not Shown (For Rubber Mounting Feet)

350-001-360	Foot, Rubber	4
170-018-115	Capscrew, Hex HD	4
545-005-115	Nut, Hex	4
400-005-115	Washer, Lock	4
901-005-115	Washer, Flat	8

Air Valve Servicing, Assembly Drawing & Parts List

(Use With Aluminum Centers Only)



****Note: Pumps equipped with this valve assembly are <u>not</u> ATEX compliant.**

****AIR VALVE ASSEMBLY PARTS LIST**

Item	Part Number	Description	Qty
1	**031-173-000 (-313)**	**Air Valve Assembly**	**1**
1-A	095-109-157 (-313)	Body, Air Valve	1
1-B	031-139-000	Sleeve and Spool Set	1
1-C	132-029-357	Bumper	2
1-D	560-020-360	O-Ring	10
1-E	165-127-157 (-313)	Cap, End	2
1-F	170-032-330 (-313)	Hex Head Capscrew 1/4-20 x .75	8
1-G	530-028-550	Muffler	1
1-H	165-096-551	Muffler Cap	1
1-J	706-026-330 (-115)	Machine Screw	4

****AIR VALVE ASSEMBLY PARTS LIST**

1	031-173-001	Air Valve Assembly	1
Consists of all components above except:			
1-F	170-032-115	Hex Head Capscrew 1/4-20 x .75	8
1-J	706-026-115	Machine Screw	4

Note: For T15 Pumps Substitute The Digits in ( ) For The Last 3 Digits Of Part Number

AIR DISTRIBUTION VALVE SERVICING

To service the air valve first shut off the compressed air, bleed pressure from the pump, and disconnect the air supply line from the pump.

Step #1: See COMPOSITE REPAIR PARTS DRAWING.

Using a 9/16" wrench or socket, remove the four hex capscrews (items 12). Remove the air valve assembly from the pump.

Remove and inspect gasket (item 18) for cracks or damage. Replace gasket if needed.

Step #2: Disassembly of the air valve.

Using a 7/16" wrench or socket, remove the eight hex capscrews (items 1-F) that fasten the end caps to the valve body. Next remove the two end caps (items 1-E). Inspect the two o-rings (items 1-D) on each end cap for damage or wear. Replace the bumpers as needed.

Remove the bumpers (items 1-C). Inspect the bumpers for damage or wear. Replace the bumpers as needed.

Remove the spool (part of item 1-B) from the sleeve. Be careful not to scratch or damage the outer diameter of the spool. Wipe spool with a soft cloth and inspect for scratches or wear.

Inspect the inner diameter of the sleeve (part of item 1-B) for dirt, scratches, or other contaminants. Remove the sleeve if needed and replace with a new sleeve and spool set (item 1-B).

Step #3: Reassembly of the air valve.

Install one bumper (item 1-C) and one end cap (item 1-E), with two o-rings (items 1-D), and fasten with four hex capscrews (items 1-F) to the valve body (item 1-A).

Remove the new sleeve an spool set (item 1-B) from the plastic bag. Carefully remove the spool from the sleeve. Install the six o-rings (item 1-D) into the six grooves on the sleeve. Apply a light coating of grease to the o-rings before installing the sleeve into the valve body (item 1-A), align the slots in the sleeve with the slots in the valve body. Insert the spool into the sleeve. Be careful not to scratch or damage the spool during installation. Carefully insert the sleeve into the bumper and end cap (with o-rings) and fasten with the remaining hex capscrews.

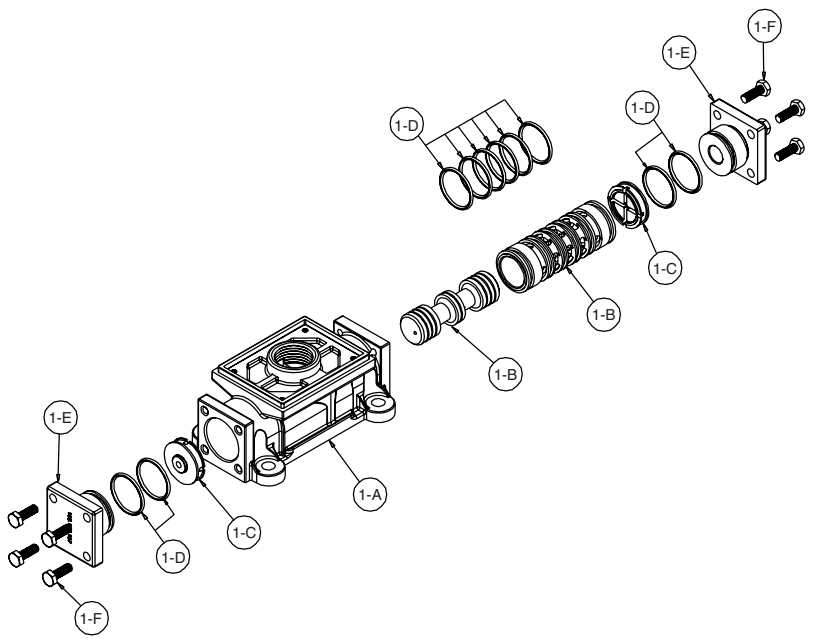
Fasten the air valve assembly (item 1) and gasket to the pump.Connect the compressed air line to the pump.The pump is now ready for operation.

⚠ IMPORTANT

Read these instructions completely, before installation and start-up. It is the responsibility of the purchaser to retain this manual for reference. Failure to comply with the recommendations stated in this manual will damage the pump, and void factory warranty.

Air Valve Servicing, Assembly Drawing & Parts List

I M2 c/b T5
II 2GD b T5



AIR VALVE ASSEMBLY PARTS LIST (Use w/Aluminum centers only)

Item	Part Number	Description	Qty
1	**031-183-000 (-313)**	**Air Valve Assembly**	**1**
1-A	095-109-157 (-313)	Body, Air Valve	1
1-B	031-139-000	Sleeve and Spool Set	1
1-C	132-029-357	Bumper	2
1-D	560-020-360	O-Ring	10
1-E	165-127-157 (-313)	Cap, End	2
1-F	170-032-330 (-115)	Hex Head Capscrew 1/4-20 x .75	8

****AIR VALVE ASSEMBLY PARTS LIST**

1	031-183-001	Air Valve Assembly	1
Consists of all components above except:			
1-F	170-032-115	Hex Head Capscrew 1/4-20 x .75	8

AIR VALVE ASSEMBLY PARTS LIST (Use w/Cast Iron centers only)

Item	Part Number	Description	Qty
1	**031-179-000**	**Air Valve Assembly**	**1**
1-A	095-109-110	Body, Air Valve	1
1-B	031-139-000	Sleeve and Spool Set	1
1-C	132-029-357	Bumper	2
1-D	560-020-379	O-Ring	10
1-E	165-127-110	Cap, End	2
1-F	170-032-115	Hex Head Capscrew 1/4-20 x .75	8

Note: For T15 Pumps Substitute The Digits in ( ) For The Last 3 Digits Of Part Number

AIR DISTRIBUTION VALVE SERVICING

To service the air valve first shut off the compressed air, bleed pressure from the pump, and disconnect the air supply line from the pump.

Step #1: See COMPOSITE REPAIR PARTS DRAWING.

Using a 9/16" wrench or socket, remove the four hex capscrews (items 12). Remove the air valve assembly from the pump.

Remove and inspect gasket (item 18) for cracks or damage. Replace gasket if needed.

Step #2: Disassembly of the air valve.

Using a 7/16" wrench or socket, remove the eight hex capscrews (items 1-F) that fasten the end caps to the valve body. Next remove the two end caps (items 1-E). Inspect the two o-rings (items 1-D) on each end cap for damage or wear. Replace the o-rings as needed.

Remove the bumpers (items 1-C). Inspect the bumpers for damage or wear. Replace the bumpers as needed.

Remove the spool (part of item 1-B) from the sleeve. Be careful not to scratch or damage the outer diameter of the spool. Wipe spool with a soft cloth and inspect for scratches or wear.

Inspect the inner diameter of the sleeve (part of item 1-B) for dirt, scratches, or other contaminants. Remove the sleeve if needed and replace with a new sleeve and spool set (item 1-B).

Step #3: Reassembly of the air valve.

Install one bumper (item 1-C) and one end cap (item 1-E), with two o-rings (items 1-D), and fasten with four hex capscrews (items 1-F) to the valve body (item 1-A).

Remove the new sleeve an spool set (item 1-B) from the plastic bag. Carefully remove the spool from the sleeve. Install the six o-rings (item 1-D) into the six grooves on the sleeve. Apply a light coating of grease to the o-rings before installing the sleeve into the valve body (item 1-A), align the slots in the sleeve with the slots in the valve body. Insert the spool into the sleeve. Be careful not to scratch or damage the spool during installation. Carefully insert the sleeve into the bumper and end cap (with o-rings) and fasten with the remaining hex capscrews.

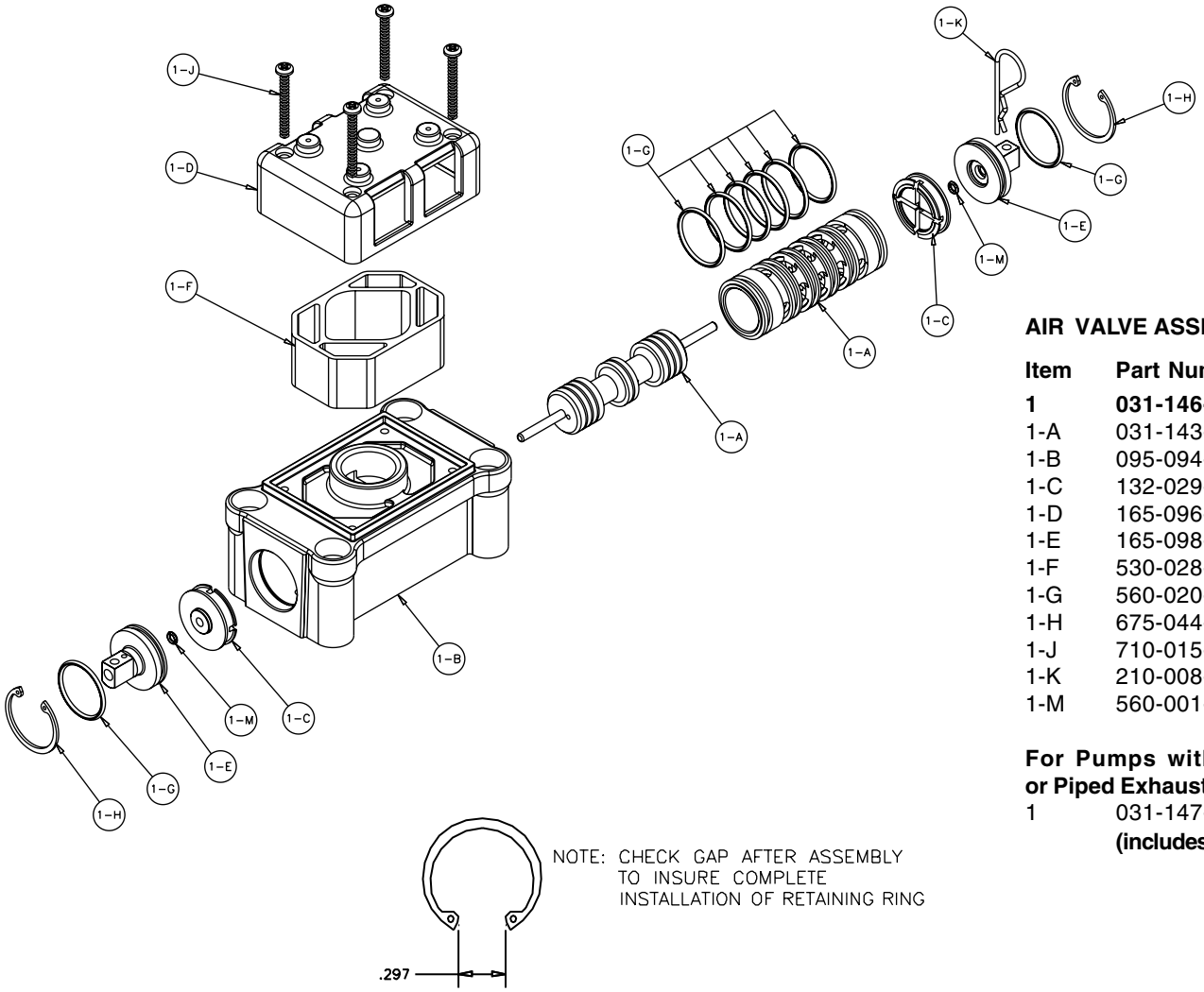
Fasten the air valve assembly (item 1) and gasket to the pump.Connect the compressed air line to the pump.The pump is now ready for operation.

⚠ IMPORTANT

Read these instructions completely, before installation and start-up. It is the responsibility of the purchaser to retain this manual for reference. Failure to comply with the recommendations stated in this manual will damage the pump, and void factory warranty.

Air Valve with Stroke Indicator Assembly Drawing, Parts List

****Note: Pumps equipped with this valve assembly are <u>not</u> ATEX compliant.**



NOTE: CHECK GAP AFTER ASSEMBLY TO INSURE COMPLETE INSTALLATION OF RETAINING RING

AIR VALVE ASSEMBLY PARTS LIST

Item	Part Number	Description	Qty
1	**031-146-000**	**Air Valve Assembly**	**1**
1-A	031-143-000	Sleeve and Spool Set	1
1-B	095-094-551	Body, Air Valve	1
1-C	132-029-552	Bumper	2
1-D	165-096-551	Cap, Muffler	1
1-E	165-098-147	Cap, End	2
1-F	530-028-550	Muffler	1
1-G	560-020-360	O-Ring	8
1-H	675-044-115	Ring, Retaining	2
1-J	710-015-115	Screw, Self Tapping	4
1-K	210-008-330	Clip, Safety	1
1-M	560-001-360	O-Ring	2

For Pumps with Alternate Mesh, Sound Dampening Mufflers or Piped Exhaust:

1	031-147-000	Air Valve Assembly	1
	(includes all items on 031-146-000 minus 1-D, 1-F, & 1-J).		

AIR DISTRIBUTION VALVE WITH STROKE INDICATOR OPTION SERVICING

To service the air valve first shut off the compressed air supply, bleed the pressure from the pump, and disconnect the air supply line from the pump.

Step #1: See COMPOSITE REPAIR PARTS DRAWING.

Using a 5/16" Allen wrench, remove the four hex socket capscrews (item 12) and four flat washers (item 36). Remove the air valve assembly from the pump.

Remove and inspect gasket (item 18) for cracks or damage. Replace gasket if needed.

Step #2: Disassembly of the air valve.

To access the internal air valve components first remove the two retaining rings (item 1-H) from each end of the air valve assembly using clip ring pliers.

Next remove the two end caps (item 1-E). Inspect the o-ring (items 1-G) and 1-M) for cuts or wear. Replace the o-rings if necessary.

Remove the two bumpers (item 1-C). Inspect the bumpers for cut, wear or abrasion. Replace if necessary.

Remove the spool (part of item 1-A) from the sleeve. Be careful not to scratch or damage the outer diameter of the spool. Wipe spool with a soft cloth and inspect for scratches or wear.

Inspect the inner diameter of the sleeve (part of item 1-A) for dirt, scratches, or other contaminants. Remove the sleeve if needed and replace with a new sleeve and spool set (item 1-A).

Step #3: Reassembly of the air valve.

Install one bumper (item 1-C) and one end cap (item 1-E) with o-rings (item 1-G and 1-M) into one end of the air valve body (item 1-B). Install one retaining ring (item 1-H), into the groove on the same end. Insert the safety clip (item 1-K) through the smaller unthreaded hole in the endcap.

Remove the new sleeve and spool set (item 1-A) from the plastic bag. Carefully remove the spool from the sleeve. Install the six o-rings (item 1-G) into the six grooves on the sleeve. Apply a light coating of grease to the o-rings before installing the sleeve into the valve body (item 1-B). Align the slots in the sleeve with the slots in the valve body. Insert the spool into the sleeve. Be careful not to scratch or damage the spool during installation. Push the spool in until the pin touches the safety clip on the opposite end.

Install the remaining bumper, end cap with o-rings and retaining ring.

Fasten the air valve assembly (item 1) and gasket (item 18) to the pump.

Connect the compressed air line to the pump. Remove the safety clip. The pump is now ready for operation.

⚠ IMPORTANT

Read these instructions completely, before installation and start-up. It is the responsibility of the purchaser to retain this manual for reference. Failure to comply with the recommendations stated in this manual will damage the pump, and void factory warranty.

Solenoid Shifted Air Valve Drawing

SOLENOID SHIFTED AIR VALVE PARTS LIST

(Includes all items used on Composite Repair Parts List except as shown)

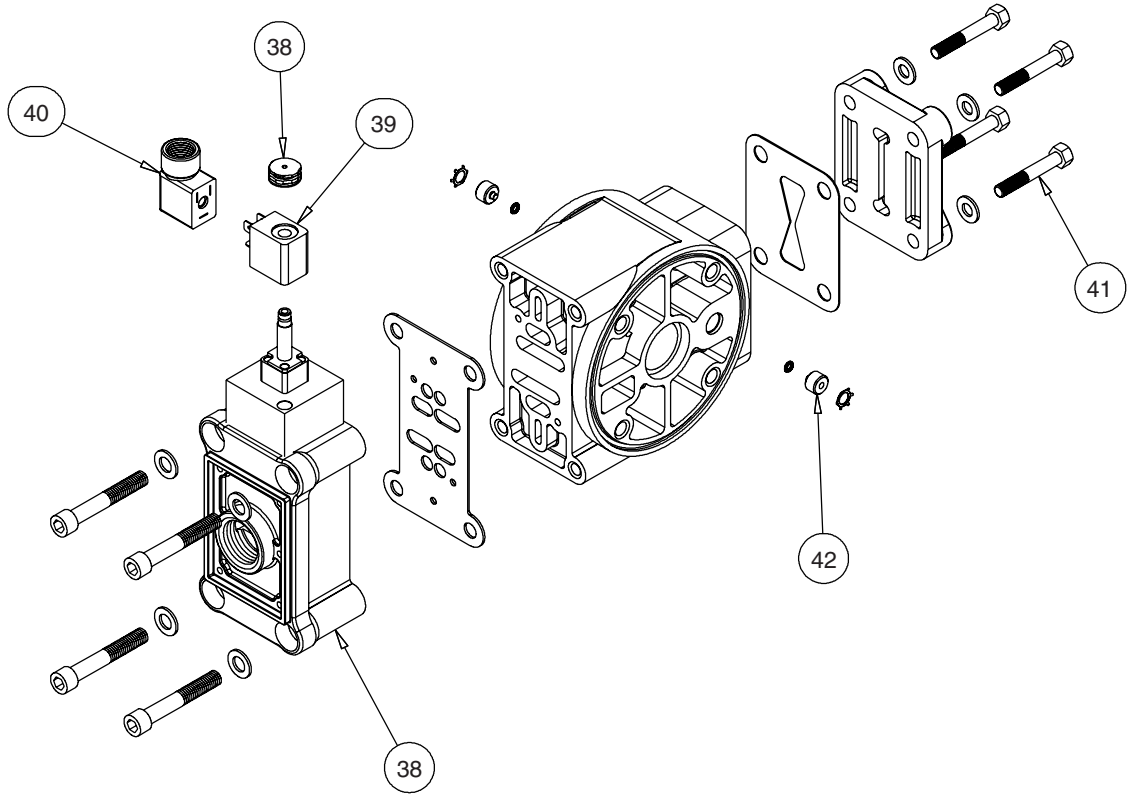
Item	Part Number	Description	Qty
38	893-097-000	Solenoid Valve, NEMA4	1
39	219-001-000	Solenoid Coil, 24VDC	1
	219-004-000	Solenoid Coil, 24VAC/12VDC	1
	219-002-000	Solenoid Coil, 120VAC	1
	219-003-000	Solenoid Coil, 240VAC	1
40	241-001-000	Connector, conduit	1
	241-003-000	Conduit Connector with Suppression Diode (DC Only)	1
41	170-029-330	Capscrew, Hex HD 5/16-18 x 1.50	4
42	618-051-150	Plug	2

For Explosion Proof Solenoid Valve

(Connector not required for explosion proof coil; coil is integral with valve)

38	893-098-001	Solenoid Valve, NEMA 7/9, 24VDC	1
	893-098-002	Solenoid Valve, NEMA 7/9, 24VAC/12VDC	1
	893-098-003	Solenoid Valve, NEMA 7/9, 120VAC	1
	893-098-004	Solenoid Valve, NEMA 7/9, 220VAC	1

****Note: Pumps equipped with Integral Solenoid Valves are <u>not</u> ATEX compliant.**



SOLENOID SHIFTED AIR DISTRIBUTION VALVE OPTION

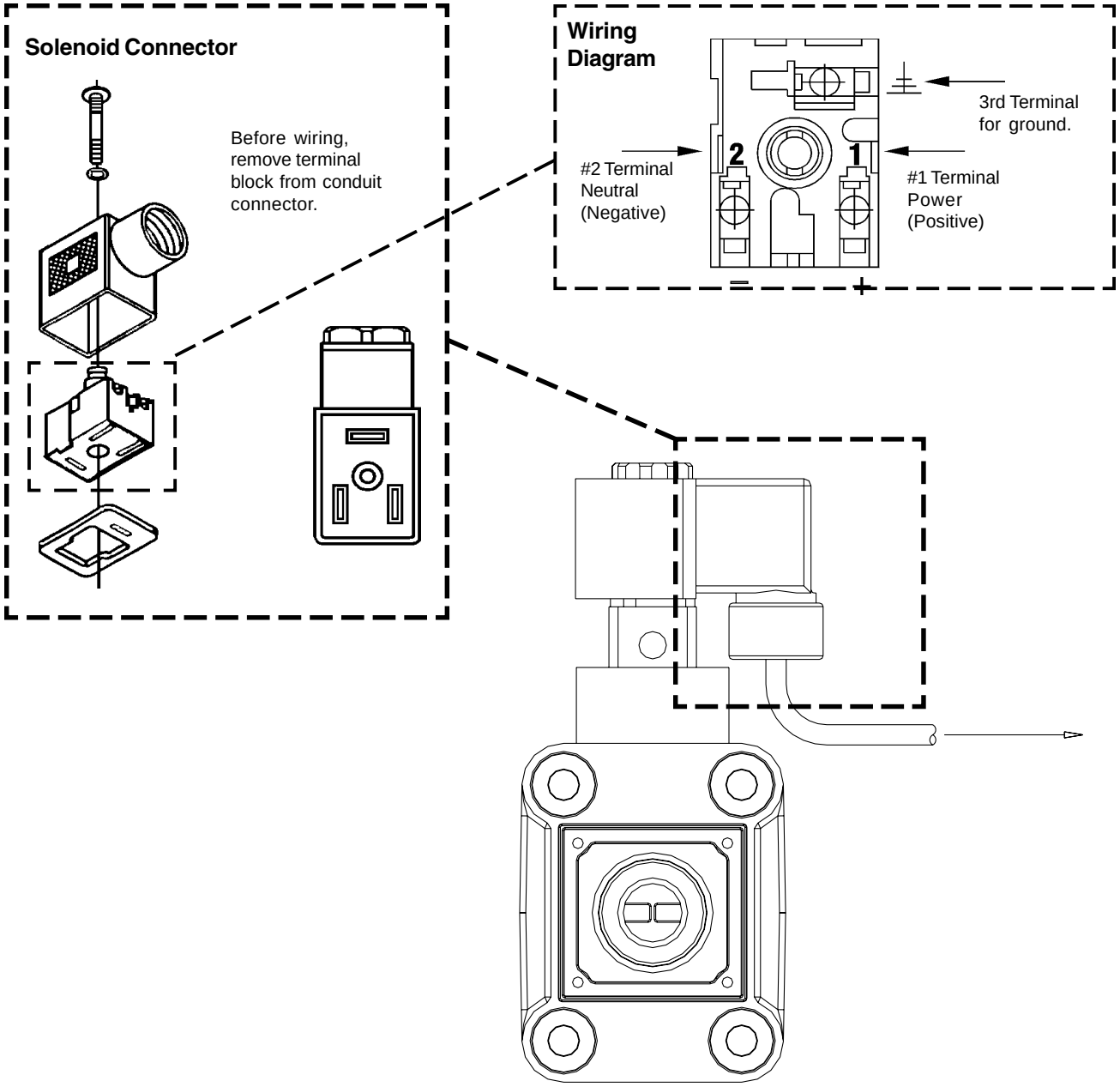
Warren Rupp's solenoid shifted, air distribution valve option utilizes electrical signals to precisely control your SANDPIPER's speed. The solenoid coil is connected to the Warren Rupp Solenoid Rate Controller/Batch Control, or a customer - supplied control. Compressed air provides the pumping power, while electrical signals control pump speed (pumping rate).

OPERATION

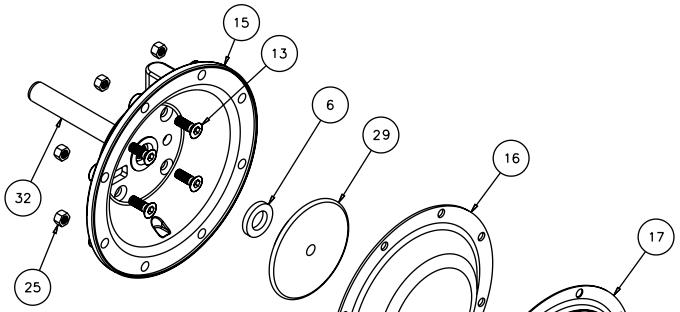
The Solenoid Shifted SANDPIPER has a solenoid operated, air distribution valve in place of the standard SANDPIPER's pilot operated, air distribution valve. Where a pilot valve is normally utilized to cycle the pump's air distribution valve, an electric solenoid is utilized. As the solenoid is powered, one of the pump's air chambers is pressurized while the other chamber is exhausted. When electric power is turned off, the solenoid shifts and the pressurized chamber is exhausted while the other chamber is pressurized. By alternately applying and removing power to the solenoid, the pump cycles much like a standard SANDPIPER pump, with one exception. This option provides a way to precisely control and monitor pump speed.

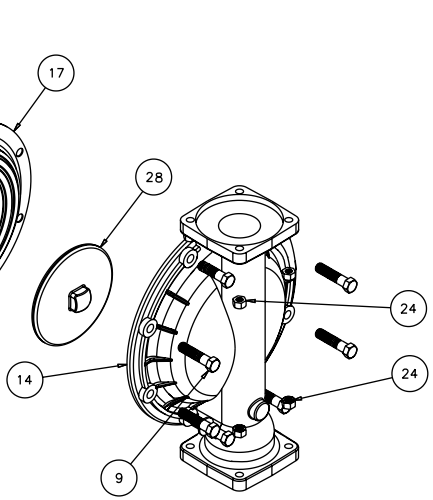
BEFORE INSTALLATION

Before wiring the solenoid, make certain it is compatible with your system voltage.

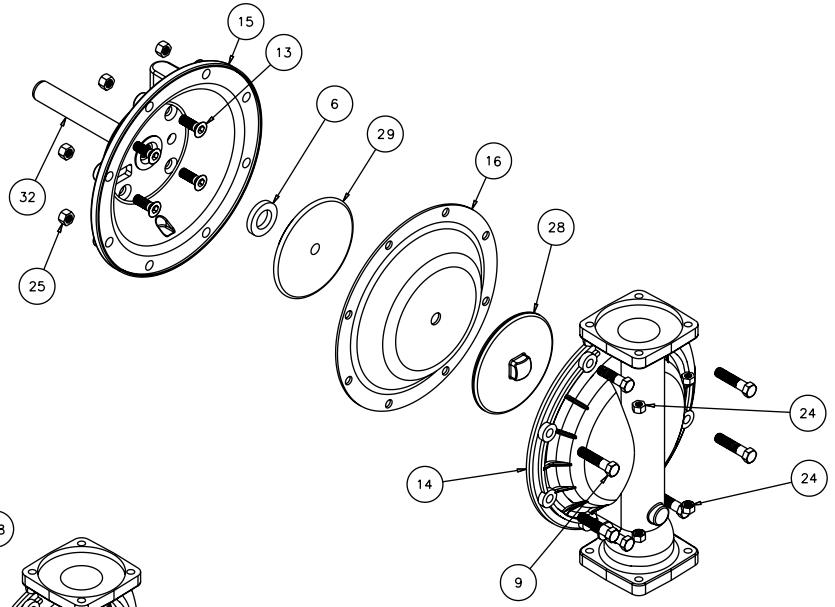


Diaphragm Service Drawing, with Overlay





Diaphragm Service Drawing, Non-Overlay



DIAPHRAGM SERVICING

To service the diaphragms first shut off the suction, then shut off the discharge lines to the pump. Shut off the compressed air supply, bleed the pressure from the pump and disconnect the air supply line from the pump. Drain any remaining liquid from the pump.

Step #1: See the pump assembly drawing and the diaphragm servicing illustration.

Using a 1/2" wrench or socket, remove the 16 capscrews (item 9) that fasten the manifolds (items 22 & 23) to the outer chambers (item 14).

Step #2: Removing outer chambers.

Using a 1/2" wrench or socket, remove the 16 capscrews (item 9), that fasten the outer chambers (item 13), diaphragms (item 14) and intermediate (item 5) together.

Step #3: Removing the diaphragms and diaphragm plates.

Use a 7/8" wrench or six point socket to remove the outer diaphragm plate assemblies, diaphragms (item 16) and inner diaphragm plates (item 29) from the diaphragm rod (item 32) by turning counterclockwise. Inspect the diaphragm for cuts, punctures, abrasive wear or chemical attack. Replace the diaphragms if necessary. DO NOT USE A WRENCH ON THE DIAPHRAGM ROD. FLAWS ON THE SURFACE MAY DAMAGE BEARINGS AND SEALS.

Step #4: Assembling the diaphragm and diaphragm plates to the diaphragm rod.

Push the threaded stud of one outer diaphragm plate assembly through the center of one diaphragm and through one inner diaphragm plate. Install the diaphragm with the natural bulge facing away from the diaphragm rod and make sure the radius on the inner diaphragm plate is towards the diaphragm, as indicated on the diaphragm servicing illustration. Thread the assembly onto the diaphragm rod, leaving loose.

Step #5: Installing the diaphragm and rod assembly to the pump.

Make sure the bumper (item 6) is installed over the diaphragm rod. Insert rod into pump.

On the opposite side of the pump, pull the diaphragm rod out as far as possible. Make sure the second bumper is installed over the diaphragm rod.

Push the threaded stud of the other outer diaphragm plate assembly through the center of the other diaphragm and through the other inner diaphragm plate. Make sure the radius on the inner diaphragm plate is towards the diaphragm. Thread the assembly onto the diaphragm rod. Use a 7/8" wrench or socket to hold one outer diaphragm plate. Then, use a torque wrench to tighten the other outer diaphragm plate to the diaphragm rod to 500 in. lbs. (56.5 Newton meters).

Align one diaphragm with the intermediate and install the outer chamber to the pump using the 8 capscrews. Tighten the opposite diaphragm plate until the holes in the diaphragm align with the holes in the intermediate. Then, install the other outer chamber using the 8 capscrews.

Step #6: Reinstall the manifolds to the pump using the 16 capscrews.

The pump is now ready to be reinstalled, connected and returned to operation.

OVERLAY DIAPHRAGM SERVICING

The overlay diaphragm (item 17) is designed to fit over the exterior of the standard diaphragm (item 16).

Follow the same procedures described for the standard diaphragm for removal and installation, except tighten the outer diaphragm plate assembly, diaphragms and inner diaphragm plate to the diaphragm rod to 500 in. lbs. (56.5 Newton meters).

⚠ IMPORTANT

Read these instructions completely, before installation and start-up. It is the responsibility of the purchaser to retain this manual for reference. Failure to comply with the recommendations stated in this manual will damage the pump, and void factory warranty.

ACTUATOR PLUNGER SERVICING

To service the actuator plunger first shut off the compressed air supply, bleed the pressure from the pump, and disconnect the air supply line from the pump.

Step #1: See PUMP ASSEMBLY DRAWING.

Using a 1/2" wrench or socket, remove the four capscrews (items 11). Remove the air inlet cap (item 8) and air inlet gasket (item 18). The pilot valve assembly (item 4) can now be removed.

Step #2: Inspect the actuator plungers.

See ILLUSTRATION AT RIGHT.

The actuator plungers (items 30) can be reached through the pilot valve cavity in the intermediate assembly (item 5).

Remove the plungers (item 30) from the bushings (item 7) in each end of the cavity. Inspect the installed o-ring (items 26) for cuts and/or wear. Replace the o-rings if necessary. Apply a light coating of grease to each o-ring and re-install the plungers in to the bushings. Push the plungers in as far as they will go.

To remove the bushings (item 7), first remove the retaining rings (item 31) by using a flat screwdriver. **NOTE**: It is recommended that new retaining rings be installed.

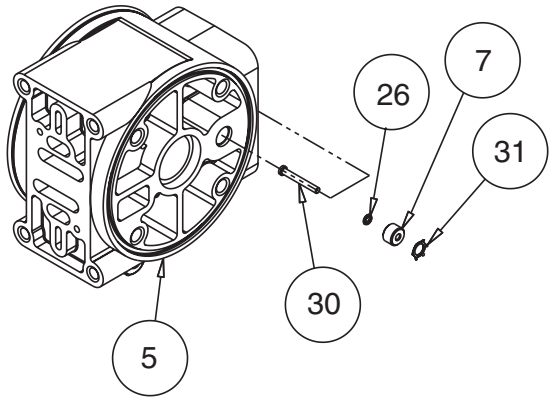
Step #3: Re-install the pilot valve assembly into the intermediate assembly.

Be careful to align the ends of the stem between the plungers when inserting the stem of the pilot valve into the cavity of the intermediate.

Re-install the gasket (item 18), air inlet cap (item 8) and capscrews (item 11).

Connect the air supply to the pump. The pump is now ready for operation.

ACTUATOR PLUNGER SERVICING



⚠ IMPORTANT

Read these instructions completely, before installation and start-up. It is the responsibility of the purchaser to retain this manual for reference. Failure to comply with the recommendations stated in this manual will damage the pump, and void factory warranty.

CHECK VALVE SERVICING

Before servicing the check valve components, first shut off the suction line and then the discharge line to the pump. Next, shut off the compressed air supply, bleed air pressure from the pump, and disconnect the air supply line from the pump. Drain any remaining fluid from the pump. The pump can now be removed for service.

To access the check valve components, remove the manifold (item 23 or item 22 not shown). Use a 1/2" wrench or socket to remove the fasteners. Once the manifold is removed, the check valve components can be seen.

Inspect the check balls (items 2) for wear, abrasion, or cuts on the spherical surface. The check valve seats (item 34) should be inspected for cuts, abrasive wear, or embedded material on the surfaces of both the external and internal chambers. The spherical surface of the check balls must seat flush to the surface of the check valve seats for the pump to operate to peak efficiency. Replace any worn or damaged parts as necessary.

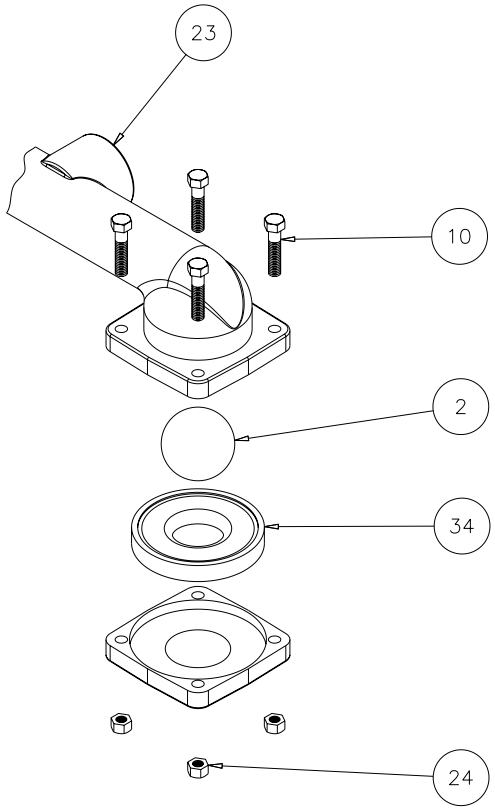
Re-assemble the check valve components. The seat should fit into the counter bore of the outer chamber.

The pump can now be reassembled, reconnected and returned to operation.

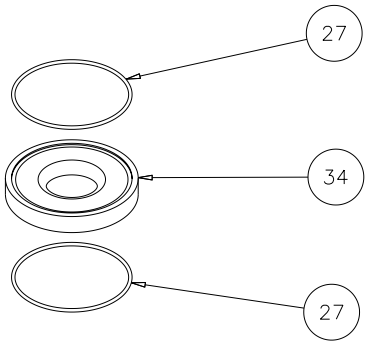
METALLIC SEATS

Two o-rings (or conductive PTFE seals) (item 27) are required for metallic seats.

Check Valve Drawing



with Non-Metallic Seats



with Metallic Seats

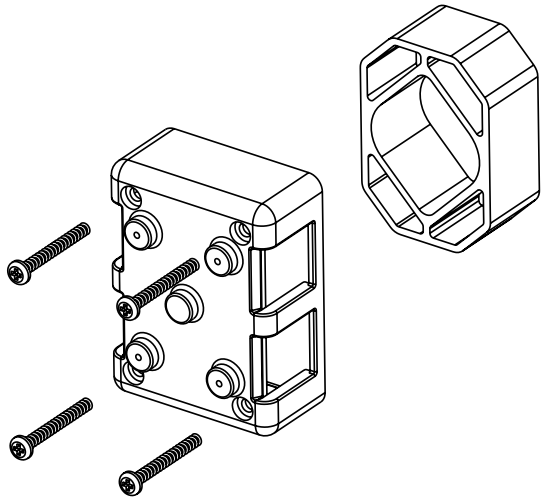
Optional Muffler Configurations, Drawing

****Note the pump is built with a metal muffler for static electrical dissipation, to meet ATEX requirements. The options shown on this page are not ATEX compliant.**

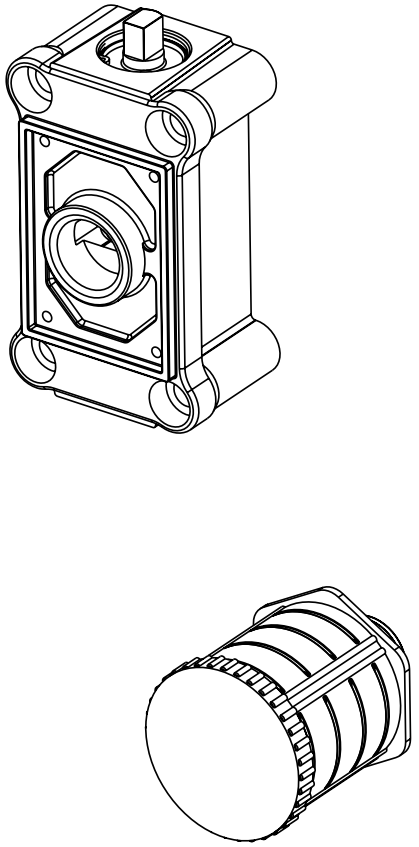
****CONFIGURATION A**
530-028-550 Encapsulated Muffler uses (1) 165-096-551 Cap and (4) 710-015-115 Self Tapping Screw (plastic valves), or (4) 706-026-330 Machine Screws (Aluminum Valves) to hold it in place.

****CONFIGURATION B**
530-010-000 Mesh Muffler screws directly into the Air Valve Body. This muffler is equipped with a metal element.

****CONFIGURATION C**
530-027-000 Sound Dampening Muffler screws directly into the Air Valve body. This muffler is equipped with a porous plastic element.



Configuration A



Configuration B and C

PUMPING HAZARDOUS LIQUIDS

When a diaphragm fails, the pumped liquid or fumes enter the air end of the pump. Fumes are exhausted into the surrounding environment. When pumping hazardous or toxic materials, the exhaust air must be piped to an appropriate area for safe disposal. See illustration #1 at right.

This pump can be submerged if the pump materials of construction are compatible with the liquid being pumped. The air exhaust must be piped above the liquid level. See illustration #2 at right. Piping used for the air exhaust must not be smaller than 1" (2.54 cm) diameter. Reducing the pipe size will restrict air flow and reduce pump performance. When the pumped product source is at a higher level than the pump (flooded suction condition), pipe the exhaust higher than the product source to prevent siphoning spills. See illustration #3 at right.

CONVERTING THE PUMP FOR PIPING THE EXHAUST AIR

The following steps are necessary to convert the pump to pipe the exhaust air away from the pump.

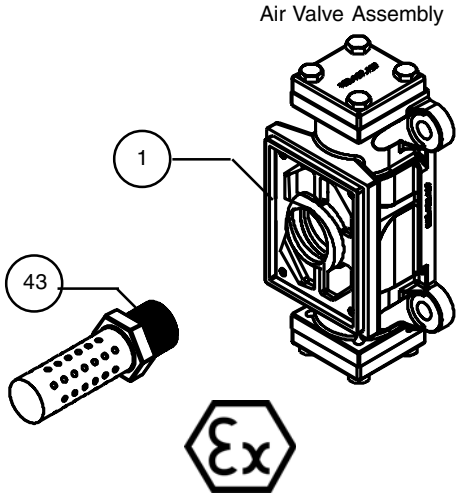
Remove the muffler (item 43). The air distribution valve (item 1) has 1" NPT threads for piped exhaust.

IMPORTANT INSTALLATION

NOTE: The manufacturer recommends installing a flexible conductive hose or connection between the pump and any rigid plumbing. This reduces stresses on the molded threads of the air exhaust port. Failure to do so may result in damage to the air distribution valve body.

Any piping or hose connected to the pump's air exhaust port must be conductive and physically supported. Failure to support these connections could also result in damage to the air distribution valve body.

Air Valve Assembly



On ATEX compliant units the pump comes equipped with a standard metal muffler

CONVERTED EXHAUST ILLUSTRATION

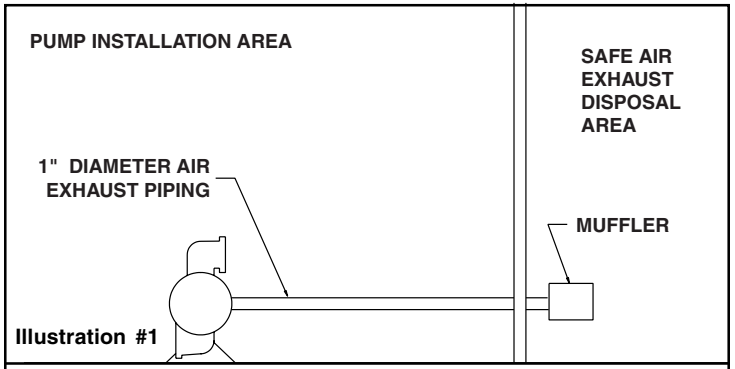


Illustration #1

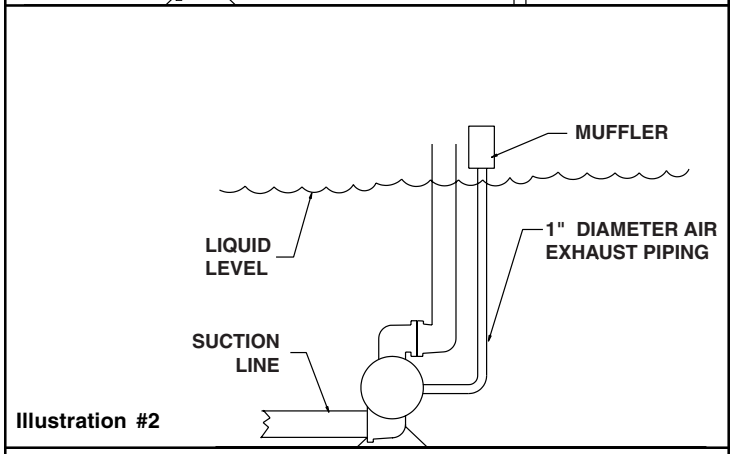


Illustration #2

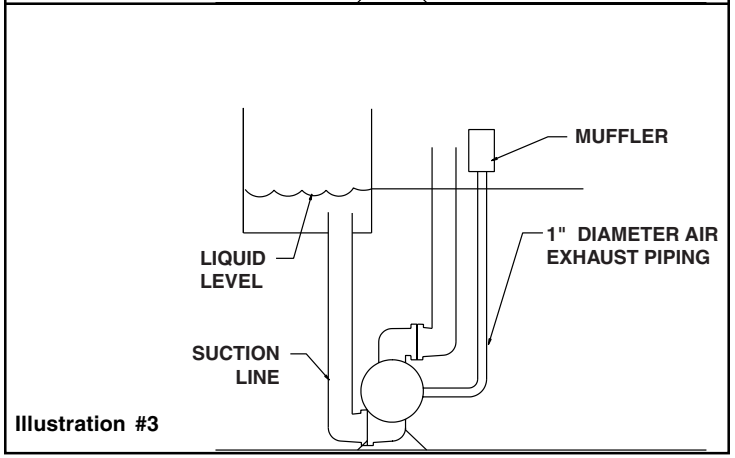


Illustration #3

*RuppTech® Leak Detection Options, Drawing

****Note: Pumps equipped with these options are <u>not</u> ATEX compliant.**

RuppTech® ELECTRONIC LEAK DETECTOR

Kit 032-037-000	100VAC	50Hz
	or 110-120VAC	50/60Hz
	or 220-240VAC	50/60Hz
Kit 032-045-000	12-32VDC	

CONFIGURATION A

To be used with the Encapsulated muffler option. You will need to mount the terminal box directly to the muffler cap on the air valve using the (2) 710-014-330 self tapping screws. Then insert the leak detectors into the bottom port in the inner chambers.

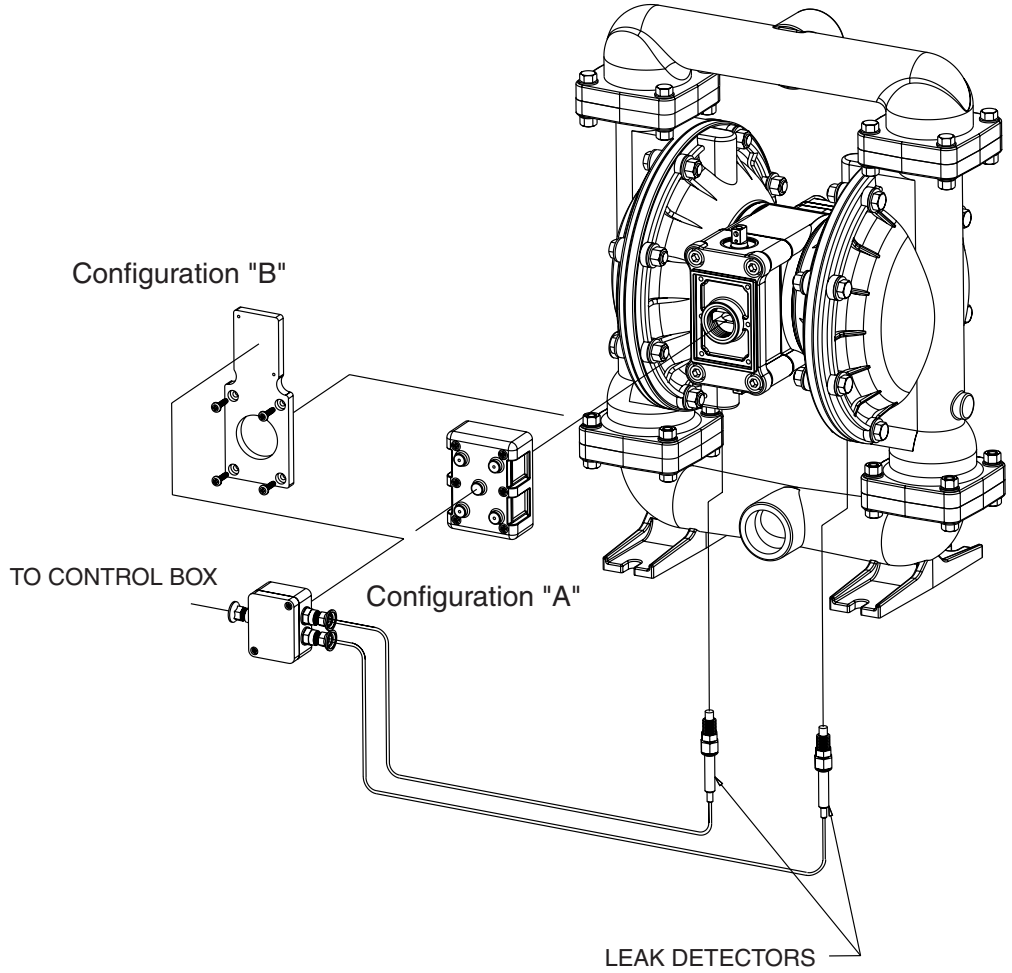
CONFIGURATION B

To be used with either of the muffler options or if your exhaust is piped away. You will need to mount the terminal box to the 612-185-552 mounting plate using the (2) 710-014-330 self tapping screws. Then mount the mounting plate directly to the air valve body using the (4) 710-009-115 self tapping screws. Then insert the leak detectors into the bottom port in the inner chambers.

MECHANICAL LEAK DETECTOR

Kit 031-023-110

Insert the leak detectors into the bottom part in the inner chambers.



*RuppTech® Pulse Output Kit Drawing & Options

RuppTech® PULSE OUTPUT KIT OPTION

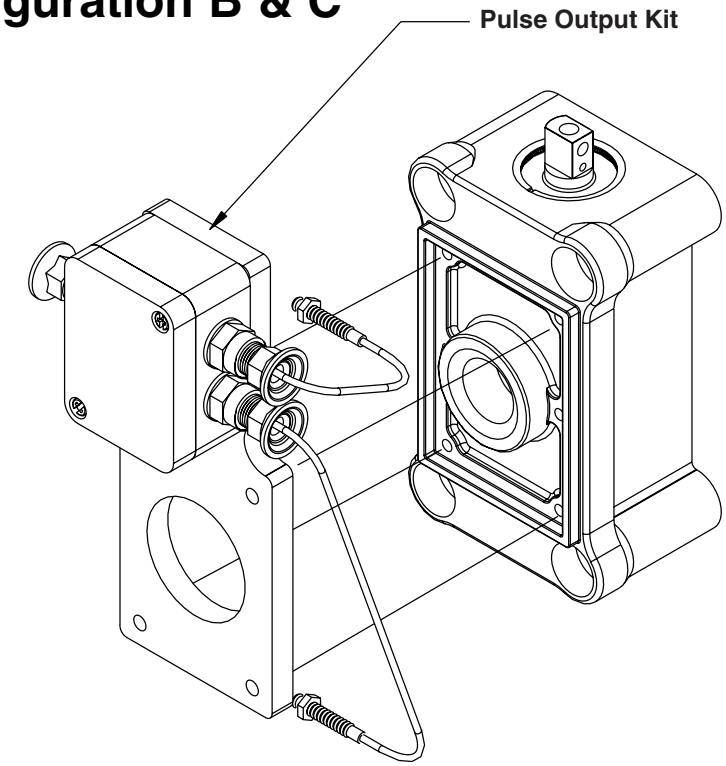
This pump can be fitted with a Pulse Output Kit. This converts the mechanical strokes of the pump to an electrical signal which interfaces with the RuppTech® Stroke Counter/ Batch Controller or user control devices such as a PLC.

The Pulse Output Kits mount directly onto the Muffler Cap on the Air Distribution Valve Assembly or onto the Air Distribution Valve Assembly when the threaded exhaust port or an auxiliary muffler is being used.

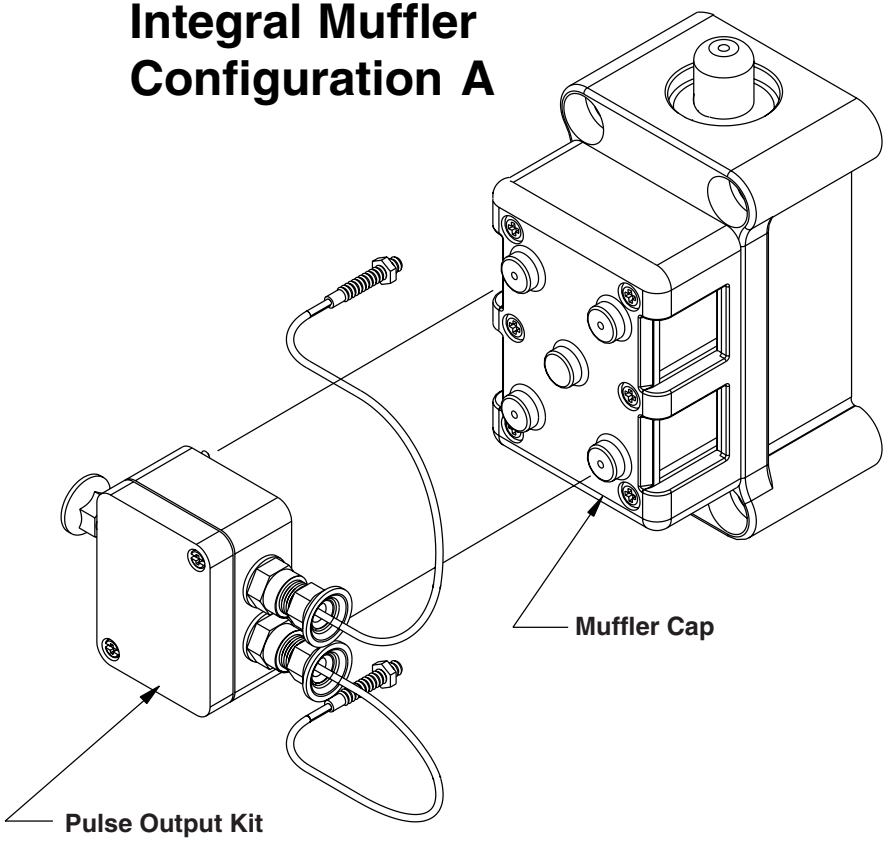
See the individual kits listed on the Pump Repair Parts List for further information.

***Note: Pumps equipped with Pulse Output Kits are not ATEX compliant**

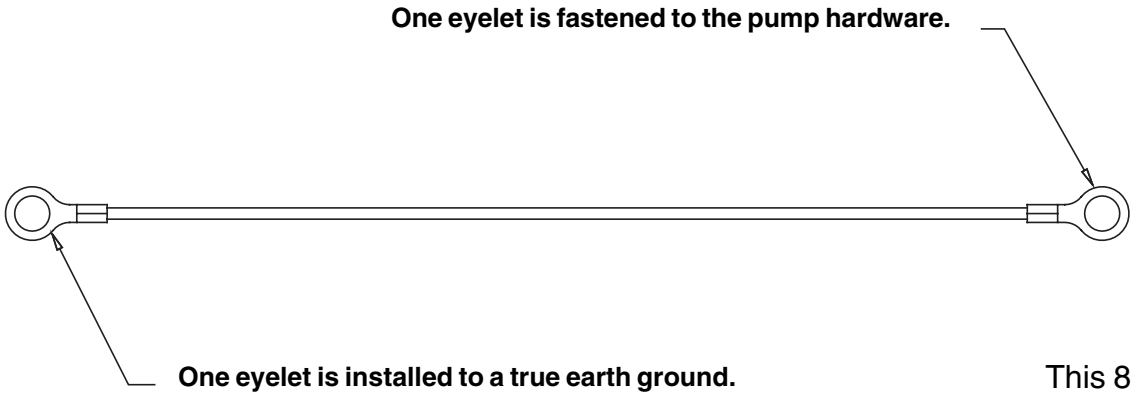
Exhaust Port or Auxiliary Muffler Configuration B & C

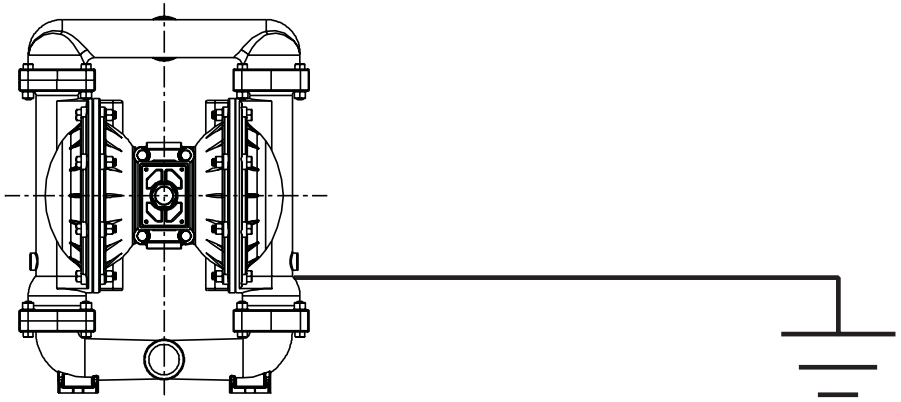


Integral Muffler Configuration A



Grounding The Pump


One eyelet is fastened to the pump hardware.
One eyelet is installed to a true earth ground.
(Requires a maximum 5/16 or 8mm diameter bolt)



This 8 foot long (244 centimeters) Ground Strap, part number 920-025-000, can be ordered as a service part.

To reduce the risk of static electrical sparking, this pump must be grounded. Check the local electrical code for detailed grounding instruction and the type of equipment required.

⚠ WARNING

Take action to prevent static sparking. Fire or explosion can result, especially when handling flammable liquids. The pump, piping, valves, containers or other miscellaneous equipment must be grounded.